Affected Environment

Chapter 3

INTRODUCTION

The purpose of Chapter 3 is to describe the physical, biological and social environments of the Curlew National Grassland (Grassland). Chapter 3 frames this understanding by reviewing the existing Grassland environment that could be affected from implementing any of the management alternatives described in Chapter 2.

Chapter 3 sets the framework for understanding the existing physical, biological, and human uses of the Grassland. Section 1, ***Physical Elements***, reviews soil, air, and water. Section 2, ***Biological Elements***, provides an overview of riparian/aquatic resources, vegetation, natural and human-caused disturbances, fish and wildlife resources. Section 3, ***Human Uses***, discusses historic and current uses of the Grassland and the social and economic setting. Section 4, ***Issues Discussion***, addresses each of the issues from Chapter 1 and establishes a current baseline for each of the issue indicators against which the environmental consequences of each action alternative is compared in Chapter 4. If you need more information, you may consult the individual specialist reports available for review at the Forest Supervisor's Office in Idaho Falls, Idaho.

Acres, maps and other illustrations used throughout this document are graphic designs and estimations that explain or show relationships rather than true on-the-ground representations. Larger more detailed maps are available for review in the Headquarters Office in Idaho Falls, Idaho.

GENERAL DESCRIPTION OF THE GRASSLAND TODAY

Today, the Curlew National Grassland incorporates about 75,000 acres within the Congressionally proclaimed boundary. The Forest Service administers only 47,600 acres. The remainder is private property. **Unless otherwise noted, "Grassland" is used throughout this chapter to mean the 47,600 acres under Forest Service administration.**

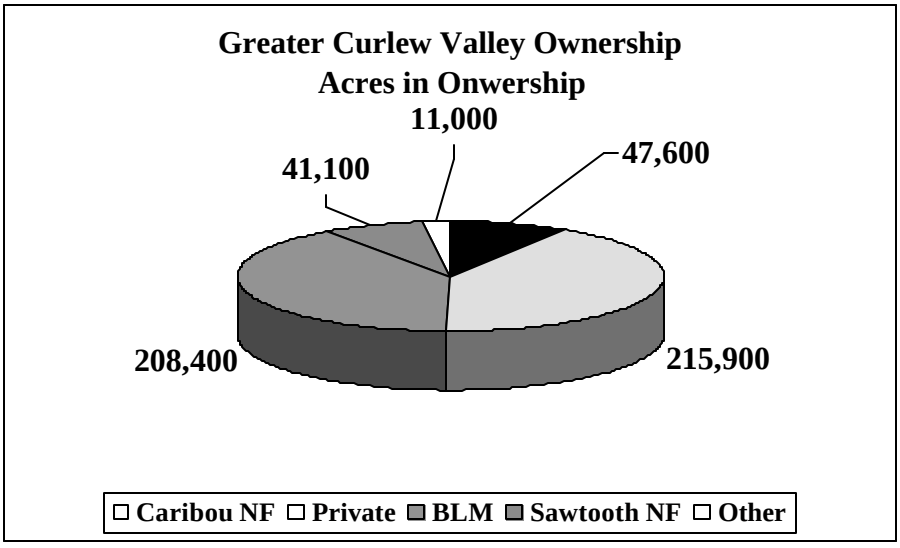
Almost all of the privately owned land within the 75,000-acre proclaimed boundary has been, and continues to be, heavily developed in farming practices of one type or another. Native vegetation, once removed and converted to some other vegetation cover type and use, does not successfully reinstate itself, as long as tillage practices continue. In contrast, the Grassland continues to be managed for a different variety and mix of resource uses and values. It exhibits a mosaic of sagebrush/grass cover types of various ages, densities and compositions of both native and non-native vegetation.

Curlew Valley Map on This page

The Grassland represents only nine percent of the larger 524,000-acre Greater Curlew Valley Area (GCVA). This area is comprised of essentially the Curlew and Pocatello Valleys, south of Rockland and west of Malad, Idaho, south to the Utah state line. Of this larger area, forty-one percent is publicly held lands administered by the Bureau of Land Management (BLM), seventeen percent is administered by the Caribou and Sawtooth National Forests, forty-one percent is privately owned, and approximately two percent is state-owned land.

The Curlew Valley is characterized as native and treated pastureland on publicly held lands, active farmlands and Conservation Reserve Program (CRP) lands on the private land.

Figure 3.1. Greater Curlew Valley Ownership in Acres
Source: Gardner Study, 1997



The area under Forest Service administration was designated a National Grassland on June 20, 1960 by the U.S. Department of Agriculture. The Grassland is part of the former Southeastern Idaho Land Utilization Project purchased by the Federal government from 1934 to 1942. At that time, the land was unsuitable for cultivation and subject to drought. The Soil Conservation Service administered these public lands from the time they were purchased until 1954 when they were placed under the administration of the Forest Service. (See landownership map on page 3-5.)

The Land Utilization Project was acquired under the authority of Title III of the Bankhead-Jones Farm Tenant Act. Title III, Section 31 of the Bankhead-Jones Farm Tenant Act states, "The Secretary is authorized and directed to develop a program of land conservation and land utilization in order thereby to correct maladjustments in land use and thus assist in controlling soil erosion, reforestation, preserving natural resources, protecting fish and wildlife, developing and protecting recreational facilities, mitigating floods, preventing impairment of dams and reservoirs, developing energy resources, conserving surface and subsurface moisture, protecting

watersheds of navigable streams, and protecting public lands, health, safety, and welfare, but not to build industrial parks or establish private or commercial enterprises."

Titles I, II, and IV were repealed by Congress by the Agricultural Act of 1961. Public Law 87-128, Title III, though not repealed, has been amended several times since 1937. In the 1960s the Secretary of Agriculture issued three administrative orders involving the National Grasslands. The 1963 Order was perhaps the most significant since this order amended the management direction in the preceding two orders. Section 213.1 of the 1963 Order in part states, "The National Grasslands shall be administered under sound and progressive principles of land conservation and multiple use and to promote the development of grassland agriculture and sustained-yield management of the forage, fish and wildlife, timber, water and recreational resources in the areas where National Grasslands are a part."

The most significant Act affecting the National Grasslands, since the passage of the Bankhead-Jones Farm Tenant Act of 1937 was the enactment of the National Forest Management Act (NFMA) in 1976. Among other things, the Act requires the preparation of management plans for all units of the National Forest System of which National Grasslands are a part. In the early days the focus of National grasslands was on the value of stabilized watersheds and productive use of forage by livestock and the relationships of both to rural community stability. Since then, many other values have been added, including oil, gas, uranium, and coal; open space vistas; cultural resources; recreation opportunities; wildlife habitat; enjoyment of native plants; threatened and endangered plant and animal species; outdoor laboratories; and solitude.

While the Preamble of the Bankhead-Jones Farm Tenant Act states that the primary purpose is to "secure occupancy of farms and farm homes," it is not an operative part of the Statute and does not preempt the direction found in the body of the legislation. The Curlew National Grassland continues to assist in securing occupancy of farms and farm homes under the National Forest Management Act (1976) by providing low-cost forage for livestock grazing, recreational uses, wildlife habitat and other multiple uses.

To date, only 12,000 acres have not been plowed and remain in a native vegetation community. Brush control and forage production for grazing livestock have been major management objectives as farmers and ranchers have come to depend on the public lands to support their own operations. Fencing and water developments have been used to attain full use of the range resources.

Other uses on the Grassland include recreational bird watching, hunting and dispersed and developed recreation. The Grassland has become a focal point for issues, such as wildlife habitat conditions, riparian area management, and watershed condition, and how these resources are influenced by livestock grazing and other management practices.

Land ownership map on this page

Grassland vegetation and topography are representative of a shrub-steppe community, predominantly covered with sagebrush and non-native seeded grasses. The Grassland is located approximately 17 air miles west of Malad, Idaho. (See General Vicinity Map on the reverse side of the Title page.)

A LOOK BACK IN TIME

In the 1860's ranchers in northern Utah began grazing their cattle in the Curlew Valley. New immigrants were farming most of the available pastures in Utah. By the 1890's the south end of Curlew Valley had been inhabited by family ranching operations. The north end had become summer range for ranchers from Malad and Cache Valley. By the turn of the century, dry farming[1] had attracted interest, and many homesteaders moved to Curlew Valley. Each homesteader claimed 160 acres to farm or ranch, and soon the entire valley was homesteaded. House and barn foundations, water wells, and trash dumps from turn-of-the-century homesteading activities remain throughout the Grassland. Most are not visible, because vegetation has re-established and covered them.

During the drought of the 1920's and 1930's, it became evident to many in Curlew Valley that the land they owned could not provide them a living. Many landowners sold their land, much of it severely eroded, to the federal government under Title III of the Bankhead-Jones Farm Tenant Act. Between 1934 and 1942, approximately 168,000 acres were purchased in and adjacent to Curlew Valley. In 1954, the Forest Service received 47,600 acres of the Land Utilization Project to administer, and a considerable acreage adjacent to Curlew National Grassland came under the administration of the Bureau of Land Management (BLM) or was sold back to private interests.

Of the 47,600 acres under Forest Service administration, about 35,500 acres were cultivated early in the century and stabilized with introduced grass species by intervening managers. After coming under Forest Service management, most of the cultivated acres, about 35,500 acres, were retreated one or more times to reduce sagebrush and to increase forage producing plants for livestock grazing. Only about 12,000 acres remain in native vegetation. Steep slopes and shallow or erodible soils were not conducive to crop production; however, these lands have been grazed by livestock since people began using the valley.

[1] **Dry farming** – farming that is engaged on nonirrigated land with little rainfall and that relies on moisture-conserving tillage and drought resistant crops (Websters New Collegiate Dictionary, 1977).

Snapshots in Time

Then…

This photograph shows deep gullies in the North 13 Field on the Grassland. The gullies were caused by heavy runoff. Picture taken on April 26, 1962 by J.K. Taylor

And Now…

This photo shows the same area in the North 13 Field. Picture taken May 1, 2000

Then…

Photograph of gullies in North Carter Field caused or made deeper by spring floods. Picture taken April 26, 1962 by J. K. Taylor.

And Now…

This photograph shows the same area in the North Carter Field today. Picture taken May 1, 2000.

Then…

This photograph shows equipment used in seeding during the Fall of 1953. Picture taken in NW portion of the south portion of Field 13

And Now…

This photograph shows the same area in the South portion of Field #13 today. Picture taken May 1, 2000.

SECTION 1 – PHYSICAL ELEMENTS

PHYSICAL SETTING

Physiography/Geomorphology

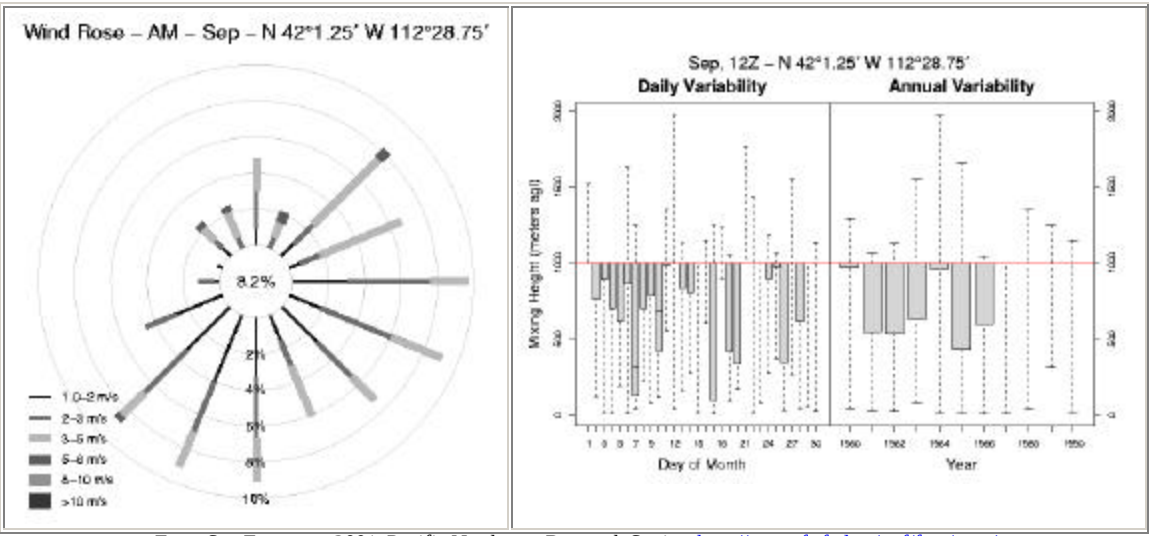
The Grassland lies within the Northwestern Basin and Range Section as described in the ***Ecological Subregions of the United States: Section Descriptions*** (McNab, *et al*, 1994). Landforms are comprised of mountains and valley floors typical of Basin and Range physiography. Geomorphic processes over time, including volcanic action, stream action, wind and receeding lakes, are responsible for the nature, origin and development of these landforms (Haskins, *et al*, 1998; Peterson, 1981). A large portion of the area, including the southern portion of the Grassland, was influenced by ancient Lake Bonneville 16,000 to 14,500 years ago. Evidence of old lake terraces and lake sediments, up to an elevation of approximately 6,000 feet above sea level, remain on the landscape and cover most of the Grassland (Currey, *et al*, 1984). Geologically, the northern portion of the Grassland developed under volcanic influences from basalt flows. The remainder of the area is mainly a result of lake deposits and marine sediments from the Paleozoic Age some 225 million years ago (Barker, 1974).

Elevations range from 4,570 to 5,940 feet above sea level. Adjacent mountain ranges have higher elevations. Black Pine Peak to the west rises to an elevation of 9,385 feet above sea level. The Samaria Mountains to the east range in elevation up to 7,795 above sea level. The Deep Creek Mountains to the north rise in elevation up to 8,670 feet above sea level (USGS, 1973; USDI, 1976).

Climate

The Curlew National Grassland has a semi-arid desert/temperate desert climate where annual water loss through surface evaporation exceeds annual water gains from precipitation (Bailey, 1998). The area has low rainfall and wide temperature contrasts between summer and winter. The mean annual precipitation ranges from five to twenty inches, depending on elevation, (Idaho Department of Agricultural Engineering, 1991) with high intensity rainstorms occurring frequently during summer months. About 50 percent of the precipitation occurs during the winter months in the form of snow. Surrounding mountain ranges affect the direction of prevailing winds that are generally from the west, south or north. The nearest weather station is in Malad City, Idaho, with a mean annual air temperature of 45.4 degrees F, and frost-free days ranging from 73 to 132. Mean summer air temperature is 66.4 degrees F. (Abramovich, *et al.*, 1998). Wind rose information for the Curlew Valley indicates that the prevailing wind directions during the burning season are from the south or southwest. See Figure 3.2.

Figure 3.2. Wind Rose and Mixing Heights for Curlew Valley



From Sue Ferguson, 2001, Pacific Northwest Research Station http://www.fs.fed.us/pnf/fera/vent/

Climates are cyclical. The "Little Ice Age", which culminated during the 1700s and early 1800s, was a period of cooler temperatures (Tausch et al., 1993). According to Leopold, climate cycles can be identified by periods of stream down-cutting in arid regions (Leopold, 1994). Historically (between 1880 and 1920), the western U.S. experienced more arid conditions with many heavy, erosive thunderstorms, and fewer, light, soaking showers. During the last few decades however, the west has changed on average to a cooler year-round climate with more precipitation. It is suggested that, because of these climatic cycles, the west is trending again toward a more arid climate in the coming decades with more intensive thunderstorms occurring (Leopold, 1994). Climatic cycles affect ecosystems because of changes in temperature, precipitation, and drought events (Luce *et al*., 1995).

Global Change

Over the past few decades, carbon monoxide emissions and the "greenhouse effect" are assumed to have caused a warming trend of one to three degrees Fahrenheit globally (UCRB Draft EIS, 1997). It is reported that greenhouse gas emissions could cause a rise in global temperature between 1.8^{o} to 6.3^{o} Fahrenheit in the next 100 years if atmospheric levels are not reduced (EPA, 1998). Carbon dioxide accounts for the largest amount of greenhouse gases in the U.S. Methane is the second largest contributor. Burning vegetation releases carbon dioxide into the atmosphere but is not listed by the EPA as a primary cause of greenhouse gases. The largest contributor of carbon dioxide is the burning of fossil fuels in electric power generation. Vegetation on the Grassland sequesters carbon as the biomass becomes re-established and abundant. This acts as a sink for carbon and as vegetation burns carbon dioxide is liberated. This cycle of biomass build-up and burning creates a carbon balance (Andreae, 1991). A carbon build-up occurs as biomass from shrubs, forbs and grasses increases on the Grassland. Because fires have been suppressed on the Grassland for the past eighty to ninety years, and less acres are being burned currently than historically burned, the Grassland is accumulating carbon from the build-up of biomass. Carbon sequestration is a viable method of reducing CO_2 in the atmosphere (EPA, 1998).

Because of scale of the Grassland is small, no methods are available to assess what management activities, such as prescribed burning, would have on global change, especially from a cumulative effects perspective. This lack of available information would not change the decision about future management of the Grassland. The Forest Service is continuing to study the effects of forest management actions on global change but no official policy has been formulated on how global change should be addressed in the Forest and Grassland Planning process. No effects were analyzed for this planning process.

Air Quality/Visibility

Air pollution is defined as the presence in the atmosphere of a substance or substances added directly or indirectly by a human act, in such amounts to adversely affect humans, animals, vegetation, or materials. Air pollutants are classified into two categories: primary and secondary. Primary pollutants are those directly emitted into the air. Under certain conditions, primary pollutants can undergo chemical reactions with the atmosphere and produce new substances known as secondary pollutants.
The federal Clean Air Act is a legal mandate designed to protect human health and welfare from air pollution. National Ambient Air Quality Standards (NAAQS) are defined in the Clean Air Act as levels of pollutant above which detrimental effects on human health or welfare may result. NAAQS have been established for the following air pollutants: particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO) and lead. An area that is found to be in violation of NAAQS is called a non-attainment area. Pollution sources contributing to non-attainment areas are subject to tighter restrictions.

The Clean Air Act also mandates "the prevention of any future, and the remedying of any existing impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution. Particulates are especially efficient at impairing visibility because of the way they scatter and absorb light.

Another provision of the Clean Air Act is the Prevention of Significant Deterioration (PSD). PSD provisions are to prevent areas that currently have very clean air from being polluted up to the maximum point established by the NAAQS. Class I areas have the tightest restrictions on how much additional pollution can be added to the air. The Curlew National Grassland is designated as a Class II area.

The Curlew National Grassland has relatively good air quality and visibility. The EPA has monitored visibility in the U.S. since 1960 using visual range monitoring. The Grassland falls within the area of the United States that has the least haze affecting visibility (EPA, 1998). Visibility varies with patterns in weather and winds (and the effects of winds on coarse particles). Industrial, agricultural, auto emissions, dust and smoke from fires reduce visibility. It is estimated that the cleanest 20 percent of the days during the year probably approach natural conditions. Smoke from frequent wildfires is suspected to have reduced pre-settlement visibility below current levels during some summer months (Greater Yellowstone Area Clean Air Partnership, 1999). Research suggests that wildland fires consumed as many as eighty-six million hectares per year in the contiguous United States during pre-industrial conditions (Leenhouts, 1998). Today, about five to seven million hectares are burned annually which indicates that reduced visibility caused by smoke may have occurred more during pre-industrial conditions. However, with the added industrial and auto emissions, visibility conditions are most likely worse now than pre-industrial conditions.

Air quality on the Grassland is currently unclassified for attainment of National Ambient Air Quality Standards (NAAQS). The nearest non-attainment area (due to PM_{10} and $PM_{2.5}$)[2] to the Grassland is the area of Pocatello and Chubbuck Idaho. The Grassland is considered a Class II[3] area authorized by the 1970 Clean Air Act. Class I[4] areas that lie within 200 kilometer (124 miles) of the Grassland boundaries are Craters of the Moon National Monument near Arco, Idaho, and Jarbidge Wilderness Area in Nevada.

Currently, treatments using prescribed fire are performed only when air quality standards will be met. The air pollutant emissions for criteria air pollutant PM_{10} in Oneida County ranges from approximately 3,000 to 10,500 tons of per year. On January 28, 1999, the Pollutant Standard Index was rated as moderate for Oneida County. (http://yosemite.epa.gov) According to the National Air Quality and Emissions Trends Report, 1996, the highest PM_{10} concentration for Oneida County is less than 55 ug/m^3 (micrograms per cubic meter) for a 24-hour period. See Table 3.1.for State of Idaho and National Ambient Air Quality Standards.

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[2] **PM** means particulate matter and the subscript number indicates the size of particulate matter in micons.

[3] **Class II Area** is any area where the air is cleaner than federal air quality standards, which is designated for a moderate degree of protection from future air degradation. Moderate increases in new pollution may be permitted in Class II areas.

[4] **Class I Area** is any area under the 1977 Clean Air Act (including amendments at 42 U.S.C. 7401 *et seq*.) that are designated for the most stringent degree of protection from future degradation of air quality. These airsheds include all international parks greater than 6,000 acres and national wilderness areas greater than 5,000 acres which existed on August 7, 1997. This class provides the most protection for pristine lands by severely limiting the amount of additional air pollution that can be added to these lands. Any subsequent additions of land to these Class I Areas also become Class I.

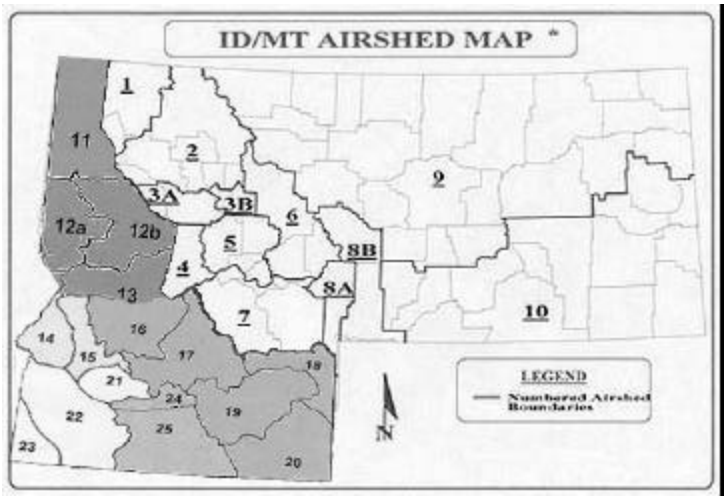
Table 3.1. State of Idaho and National Ambient Air Quality Standards

Pollutant	Averaging Time	Concentration
Ozone	1 hour	235 ug/m3 (0.12 ppm)
	8 hours	157 ug/m3 (0.08 ppm)
Carbon Monoxide	1 hour	40,000 ug/m3 (35 ppm)
	8 hours	10,000 ug/m3 (9.0 ppm)
Nitrogen Oxides	Annual Arithmetic Mean	100 ug/m3 (0.05 ppm)
Sulfur Dioxide	Annual Arithmetic Mean	80 ug/m3 (0.03 ppm)
	24 hours	365 ug/m3 (0.14 ppm)
	3 hours	1,300 ug/m (0.5 ppm)
Particulate Matter as PM10	Annual Arithmetic Mean	50 ug/m3
	24 hours	150 ug/m3
Particulate Matter as PM2.5	Annual Arithmetic Mean	15 ug/m3
	24 hours	65 ug/m3

Ug/m3 = micrograms per cubic meter; ppm = parts per million.
Source: Code of Federal Regulations, 40 CFR Part 50, National Primary and Secondary Ambient Air Quality Standards.

The area of Pocatello and Chubbuck, Idaho is currently designated a non-attainment area for PM_{10} and $PM_{2.5}$, and is considered an impact area in airsheds 19 and 20. During the year 1999, the Portneuf Valley airshed exceeded the Ambient Air Quality Standards for PM_{10} on three occasions. The Idaho State Department of Environmental Quality Airshed Management Program in the Portneuf Valley is developing an implementation plan to address the problems and ensure compliance with air quality standards (T. Floyd, DEQ, 2001). Figure 3.3 shows the location of the airsheds in Idaho and Montana.

Figure3.3. Montana/Idaho Airshed Map



Smoke Management

Since 1998, the Curlew National Grassland has been subject to the Montana/Idaho State Airshed Group Smoke Management Plan (Mathews and Acheson, 1999). This plan requires the Forest Service to report all proposed prescribed fires annually, and one day prior to burning by airshed. The objective is to regulate prescribed burning for the purpose of minimizing impacts from smoke, and protecting State and Federal ambient air quality standards. Information such as estimated fuel load, number of acres, elevation and type of burn, etc., is reported to the Northern Rockies Coordination Center in Missoula, Montana before burning can take place.

Prescribed fires on the Grassland are conducted only when favorable meteorological conditions and air quality conditions exist and when State and Federal ambient air quality standards will not be exceeded. Smoke dispersion models are produced by the Airshed Group to determine if restrictions are necessary. The Forest Service is not permitted to light prescribed fires when burn restrictions are imposed by the Monitoring Unit in Missoula, Montana. In the past, most of the prescribed fires on the Grassland have been conducted in the fall (K. Timothy, 2001). Approximately 10,000 acres have been burned on the Grassland using prescribe fire methods during the past forty years. Another 3,750 acres have been burned by wildfires during the same time period. Holbrook, Idaho and Snowville, Utah are the two sensitive receptors for smoke emissions produced on the Grassland.

Fire management and wildfire have the greatest potential to effect air quality and visibility on the Grassland and surrounding areas. Fires produce air pollutants in the form of carbon monoxide, nitrogen oxides, volatile organic compounds, and particulate matter (measured by PM_{10} and $PM_{2.5}$). These smaller particles are likely responsible for most of the adverse health effects because they have the ability to reach the thoracic region of the respiratory tract (Greater Yellowstone Area Clean Air Partnership, 1999). Currently, fuel loading in sagebrush vegetation on the Grassland has increased along with the risk of uncontrolled wildfires that may contribute to smoke emissions in the future. Prescribed fire provides a method to control the timing and amounts of smoke emissions, reduce fuel build up, and reduce the risks associated with uncontrolled wildfires (J. Kidd, 2001). Actions will be taken, including timing to provide for smoke dispersion, burning when there are efficient fuel moisture levels, public notification, and favorable meteorological conditions, to minimize smoke emissions that may affect public health. Monitoring requirements will be identified before project implementation at the site-specific level.

Because the State of Idaho regulates control of air pollution through Title 39 of the Idaho Code, the Forest Service protects air quality through compliance with the rules, regulations and procedures of the Idaho Department of Environmental Quality. The Forest Service will continue to cooperate with other Federal, State and local air quality regulatory agencies to maintain or improve air quality. During burning treatments, the Forest Service follows the Montana Idaho Smoke Management Plan and Program and complies with the EPA's Interim Air Quality Policy on Wildland and Prescribed Fires (EPA, 1998). The Interim Policy is Federal policy which reconciles the competing needs to conduct prescribed fires while at the same time to maintain clean air to protect the public health.

Soils/Ecological Land Units

Soils and ecological land units are described at three different scales - the subsection (tens of square miles), the landtype association (100's to 1,000's of acres), and the landtype levels (10's to 100's of acres).

The Curlew National Grassland boundaries fall within two subsections:[5] the *Humboldt River High Plateau* and the *Curlew Valleys and Lake Sediments.* A characterization of the subsections is provided in Table3.2. These subsections differ by physiography, mean annual precipitation, dominant vegetation and average slope (USDA Forest Service, 1997).

Table 3.2. Subsection Descriptions for the Curlew National Grassland

Descriptor	Humboldt River High Plateau	Curlew Valley and Lake Sediments
Elevation	5,100 to 7,500 feet	4,500 to 6,000 feet
Dominant Slope Gradient	5 to 60%	0 to 25%
Major Vegetation Type	Sagebrush/shrub	Sagebrush/Salt desert shrub
Geomorphic Processes	Volcanic, fluvial	Lacustrine
Mean Annual Precipitation	8 to 20 inches	5 to 20 inches
Mean Annual Air Temperature	42 to 47° F.	45 to 55° F.
Natural Disturbances	Flooding, fire, insects	Flooding, fire, insects
Human Disturbances	Grazing, agriculture, cross-country travel	Grazing, agriculture, cross-country travel
Landscape Setting	Mountains, narrow valleys, and foothills	Valley bottoms and terraces
Parent Material	Basalt, marine sediments	Bonneville Lake sediments
Soils	Calcixeroll, Haploxerolls	Calcixerolls, Natrargids
Percent of Acres in each Subsection	44%	56%

Two Landtype Associations (LTAs)[6] have been mapped on the Curlew National Grassland. They are *Curlew Alluvial Fans and Volcanic Scarp Hillslopes/Basin Big Sagebrush-Mountain Big Sagebrush LTA*; and *Curlew Lacustrine Deposits and Old Lake Bottom Terraces/Basin Big Sagebrush- Salt Desert Shrub LTA* (USDA-FS, 1997). Most of the soils in these LTAs are high in calcium carbonate content. Some soils in the lower valleys with salt desert shrub present are high in sodium content. The dominant soils classify as Typic Calcixerolls[7] and Calcic Haploxerolls[8] (Davidson, 1977).

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[5] A **subsection** is an ecological subdivision of land that has similar geology, lithology, geomorphic processes, soil groups, subregional climate, and potential natural communities.

[6] **Landtype Associations** (LTAs) are groupings of landtypes or subdivisions of Subsections, based upon similarities in geomorphic process, geologic rock type, soil complexes, stream types, lakes, wetlands, and series, subseries, or plant association in vegetation communities. Repeatable patterns of soil complexes and plant communities are useful in delineating map units at this level. Names of LTAs are often derived from geomorphic history and vegetation community.

[7] **Typic Calcixerolls**. This soil type is defined as deep soils that have a moderately thick surface layer that is dark from increased organic matter and have a xeric moisture regime. This means the soils are dry in the summer, but they receive and store enough water in winter and early spring to provide some moisture for spring and early summer crops. They do not have a fluctuating ground water table accompanied with redox concentrations.

[8] **Calcic Haploxerolls**. This soil type is defined as freely drained soils that have a xeric moisture regime and do not have aquic conditions within 75 cm of the mineral surface. They have high base satruation and have a calcic horizon or identifiable secondary carbonates usually within 110 cm of the mineral surface.

In 1977, the Grassland soils were mapped at the landtype level and described in the *"Soils Inventory of the Curlew National Grasslands"* (USDA-FS, 1977). Recently, the Natural Resource Conservation Service (NRCS) updated soil mapping on the Grassland in the Oneida County Soil Survey. This unpublished draft provides site-specific information on erosion hazards, potential soil productivity, and other soil characteristics and interpretations useful in programmatic planning and implementation. Characteristics of the landtypes on the Curlew National Grassland are displayed in Table 3.3.

Table 3.3. Curlew National Grassland Landtype Characteristics

Landtype Number	Unstable Area	Average Slope	Rock Type	Vegetation Type	Sheet Erosion	Hydro. Group[1]	Existing Ground Cover[2]
047	2%	8%	Alluvium, lacustrine	Sage/grass	Moderate	C	80%
050	0%	8%	Alluvium, lacustrine	Sage/grass	Slight	B to C	50%
051	0%	8%	Alluvium, lacustrine	Sage/grass	Slight	A to B	60%
052	0%	4%	Alluvium, lacustrine	Sage/grass	Slight	B to C	60%
062	0%	8%	Alluvium, lacustrine	Sage/grass	Slight	C	70%
090	0%	15%	Alluvium, lacustrine	Sage/grass	Moderate	B to C	50%
490	0%	20%	Volcanic, alluvium	Sage/grass, mountain brush	Severe	C to D	40%
491	0%	8%	Volcanic, alluvium	Sage/grass, mountain brush	Severe	B to C	50%

1 Soils not protected by vegetation are assigned to one of four hydrologic groups. Hydrologic groups are used to estimate runoff from precipitation. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

Group A – Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of moderately deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B – Soils having a moderate infiltration rate when thoroughly wet. These consist mainly of moderately deep or deep, moderately well drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C – Soils having a slow infiltration rate when thoroughly wet. These consist of soils having a layer that impedes the downward movement of water in soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D – Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These soils consist of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

2 Ground cover is an estimate of the existing ground cover based on measurement taken during the 1960's on the Grassland.

Landtypes 490 and 491 are listed in Landtype Capability Group K (Stable Foothills) in the 1985 Forest Plan (USDA-FS, 1977). These landtypes are currently managed under a "non-intensive" management prescription due to erosion potential. These soils have a moderate to high inherent erosion hazard because they generally appear on steeper slopes and are susceptible to erosion during intense summer thunderstorms. All other landtypes fall in Landtype Capability Group C (Toeslopes & Fans, Low Elevations) and D (Bottomlands). These landtypes are currently managed with a "range intensive" management prescription. Although the soils in these landtypes have a slight to moderate erosion hazard, they are less susceptible to gully erosion, because they occur on gentler slopes and are better protected by vegetation and ground cover (Forest Plan, 1985).

Current soil erosion on the Grassland is estimated to be approximately 0.01 to 3.8 tons per acre per year on slopes less than 8 percent. Soil erosion potential ranges from approximately 0.4 tons to 49.9 tons per acre per year on slopes from 9 percent to greater than 35 percent (Davidson, 1977).

Grazing practices have compacted and reduced infiltration capacity of soils in some areas, resulting in detrimental soil conditions [9] (Scholl, 1989; Meeuwig, *et al*., 1975; Alexander, *et al*., 1990; Willat, *et al*., 1983). These degraded areas are generally found adjacent to riparian areas and areas where livestock concentrate, such as fence lines, watering areas and salting grounds. About 75 percent of the Grassland has been cultivated in the past. Most of the area was seeded to non-native grasses.

Some farming practices also contribute to high erosion losses that occur in the Curlew Valley. Dry land wheat farms are adjacent to, and sometimes surround, portions of the Grassland. These farms are left fallow every other year and produce large amounts of sediment from intense storm events. The sediment from these storm events is either washed onto the Grassland or flushed through the riparian areas. The riparian areas, where these floods occur, are not given time to heal between the flood events and continue to downcut and scour.

Soil Microbiotic Crusts

Microbiotic crusts are formed by living organisms and their by-products, creating a surface crust of soil particles bound together by organic materials. They are predominantly composed of cyanobacteria (formerly blue-green algae), green and brown algae, mosses and lichens. Liverworts, fungi, and bacteria can also be important components. Because microbiotic crusts are concentrated in the top one to four millimeters of soil, they affect processes that occur at the soil-air interface. These include soil stability, erosion, atmospheric N-fixation, [10] nutrient contributions to plants, soil-water relationships, infiltration, seeding germination, and plant growth (USDI, 2001).

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[9] **Detrimental soil condition** occurs when soil hydrological function and site productivity are adversely affected.

[10] **N-fixation** is the conversion of elemental nitrogen (N2) to organic ocombinations or to forms readily utilizable in biological processes (Soil Science Principles and Practices, 1972).

Microbiotic crust usually form on arid and semi-arid lands in open bare soil spaces between plants. They form in hot, cool and cold arid and semi-arid regions (USDI, 2001). On rangelands, they function as living mulch by retaining soil moisture and discouraging annual weed growth. They reduce wind and water erosion and contribute to soil organic matter. In sagebrush communities on the Grassland, microbiotic crusts are less dense due to dense vascular vegetation and accumulation of plant litter (USDI, 2001; NRCS, 1997; USFS, 1999).

Before the Grassland was acquired by the Federal Government through the Bankhead-Jones Farm Tenant Act in the late 1930's, approximately 35,000 acres were cultivated and farmed which would have destroyed all microbiotic crusts. Since that time, microbiotic crusts have re-established and are represented on most sites that have not been recently treated. On sites that have been recently plowed to remove bulbous bluegrass in the understory, soil crusts are not represented and require time to recolonize. Hot ground fires can also kill microbiotic crusts. However, historic fire regimes usually allow enough time for crustal organisms to recolonize. Recovery of microbiotic crusts and vascular plants after treatments is dependent on protection of these sites from disturbances for a period of time. Treated sites on the Grassland are generally rested from disturbances such as grazing for at least two growing seasons after treatments occur. This usually provides enough time for crustal organisms to begin recolonization (NRCS, 1997). Much more time is required for full recovery (Kaltenecker, *et al*., 1994).

Microbiotic crusts are recognized as an important aspect of soil quality as discussed above. Soil quality direction is provided in the Land and Resource Management Plan to conserve and/or restore microbiotic crusts and fine organic matter. As more information becomes available on how microbiotic crusts respond to management activities, adaptive management will be applied to improve fine organic matter on the soil surface and microbiotic crusts where necessary to reduce erosion.

Watersheds

The Grassland lies within two major drainage basins. Rock Creek, a small segment located in the northernmost portion of the Grassland area, drains north toward the Snake River and eventually into the Columbia River Basin (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969). The majority of the Grassland lies within the Great Basin and drains into the Great Salt Lake. (See Watershed Map on page 3-22.)

Both the Columbia River and Great Basins are subdivided into a number of smaller watersheds and identified by a numbering system developed by the U.S. Geological Survey. For example, Rock Creek drainage is nested within the Raft River drainage that is within the Snake River drainage in the Columbia River Basin. Likewise, the Great Basin is subdivided into numerous watersheds, one of which is the Curlew Valley (USGS, 1974 and 1987).

The Curlew Valley is a 1,200 square mile watershed that straddles the Utah/Idaho state line. The valley is bounded by the Raft River and Black Pine mountains on the west, the Sublett Range and Deep Creek mountains on the north, and the Blue Spring Hills and North Promontory mountains on the east. The drainage basin is open on the south, where it drains into the Great

Salt Lake (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969). Figure 3.4 graphically shows the hydrogeologic setting of the Great Basin Regional Aquifer.

Figure 3.4. Hydrogeologic Setting of the Great Basin Regional Aquifer

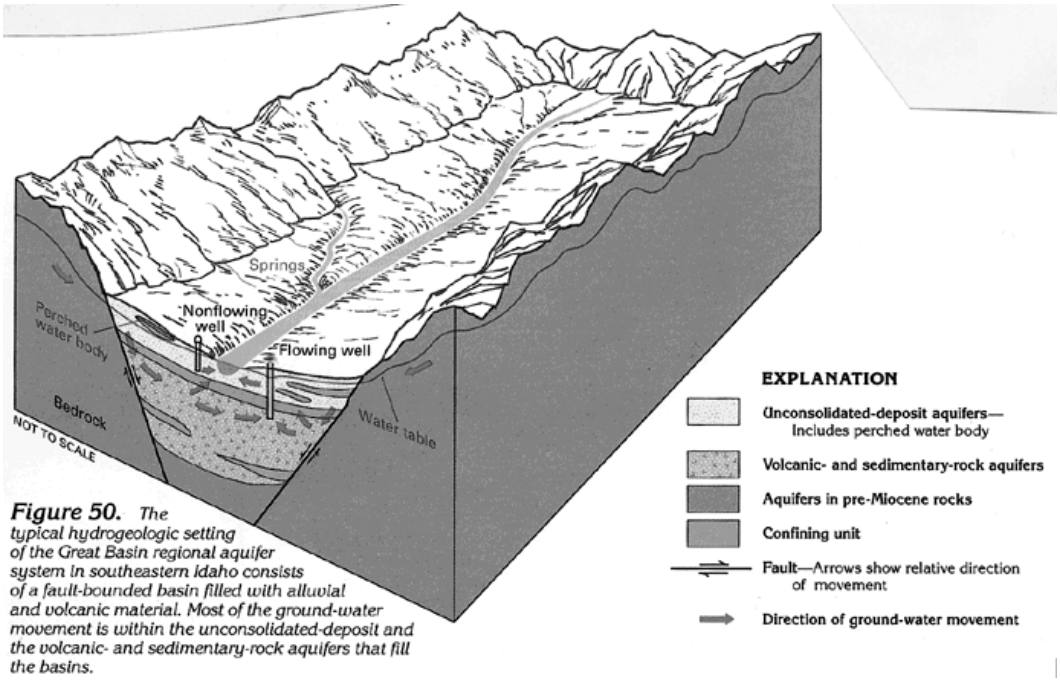


Figure 50. The typical hydrogeologic setting of the Great Basin regional aquifer system in southeastern Idaho consists of a fault-bounded basin filled with alluvial and volcanic material. Most of the ground-water movement is within the unconsolidated-deposit and the volcanic- and sedimentary-rock aquifers that fill the basins.

Figure courtesy of USGS

The actual area occupied by the Grassland within the Raft River and Curlew Valley drainages is small. Only about 0.4 percent of the total watershed is occupied by the Grassland. In the Curlew Valley drainage, the Grassland occupies only about 4 percent of the total watershed (USFS, 1998). As a result, the influence of Grassland management activities on the overall Raft River and Curlew Valley watersheds is minimal.

The Grassland contains four subwatersheds that lie within the Raft River and Curlew Valley drainages: Rock Creek, Deep Creek, South Fork Rock Creek and Buist, which contains Sheep Creek (USFS, 2001). (See Map Watershed Map on page 3-22). The majority of the land base in these watersheds lies outside the 47,600-acre portion administered by the Forest Service and is either privately owned or managed by the Bureau of Land Management (BLM) (USFS, 2001). Table 3.4 displays the percentage of each watershed on the Grassland under Forest Service management.

Table 3.4. Percentage of Subwatersheds on the Grassland Under Forest Service Management

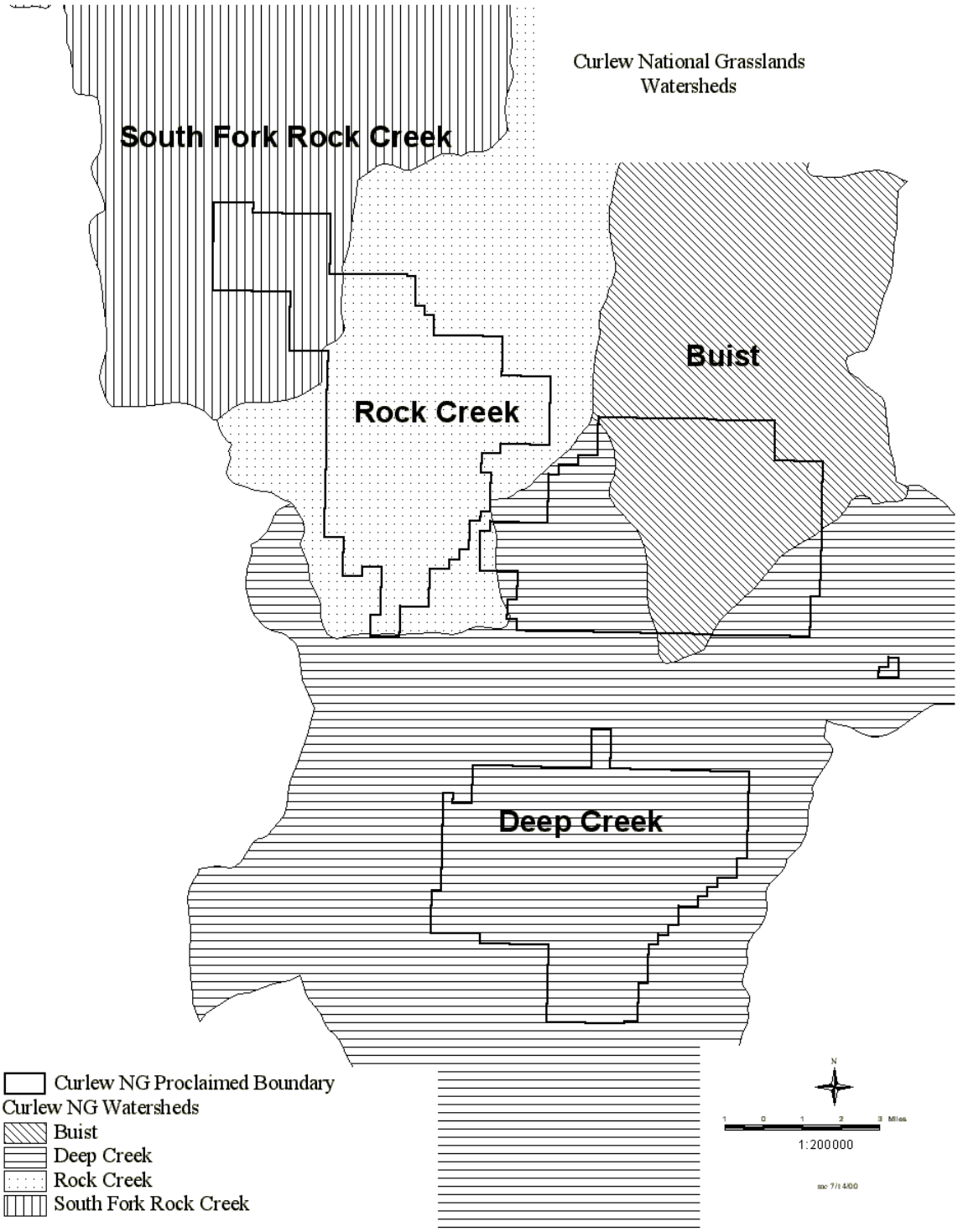
Drainages (subwatersheds)	Percentage Under Forest Service Administration	Percentage Under Other Ownership
Rock Creek	27 %	73%
Buist	10%	90%
Deep Creek	5%	95%
SF Rock Creek	4%	96%

Even within the Forest Service portion, much of the land is privately owned. For example, of the 22 sections[11] of land in the Buist watershed, eight sections, or about 36 percent, are privately owned. (See Landownership Map on page 3-5.) As a result activities that occur outside the Grassland boundary influence overall watershed conditions to a greater degree than activities within the Grassland boundary.

Intense summertime thunderstorms can cause extreme fluctuations in streamflow hydrographs, from small baseflows of less than one cubic foot per second (cfs) to hundreds (estimated) of cfs and back to base flow within a 24-hour period. These extreme flow fluctuations have a profound effect on channel stability and water quality (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969).

Most of the watersheds have been impacted by a variety of human and natural activities and events. These activities have affected the overall function and condition of the watersheds throughout the area and have had a direct effect on the function and condition of watersheds within the Grassland boundary. The Environmental Protection Agency (EPA) and the U.S. Geological Survey (USGS) (EPA, 1998) evaluated the overall health of the watersheds within and around the Grassland. Ratings indicate these watersheds are showing more serious water quality problems and low vulnerability to stressors, such as pollutant loadings.

[11] A **section** contains 640 acres.


Curlew National Grasslands
Watersheds
South Fork Rock Creek
Rock Creek
Buist
Deep Creek
Curlew NG Proclaimed Boundary
Curlew NG Watersheds
Buist
Deep Creek
Rock Creek
South Fork Rock Creek
N
1 0 1 2 3 Miles
1:200000

Surface Water Hydrology

Deep Creek (sometimes referred to as Bull Canyon Creek) is the primary drainage within the Curlew Valley. It flows southward into Utah toward the Great Salt Lake. Rock Creek, a major tributary to Deep Creek, rises on the southwest flank of the Deep Creek Mountains and joins Deep Creek near Holbrook, Idaho. Both drainages are highly influenced by irrigation diversions and runoff from agricultural fields. About three miles below Holbrook, a group of springs, sometimes called Deep Creek Springs, Big Springs, or Holbrook Springs, arise in the channel of Deep Creek. About four miles below the springs, Curlew Valley Reservoir, or Stone Reservoir, holds and diverts water from Deep Creek for irrigation purposes. Much of the water flowing from the springs is diverted for agricultural irrigation before it reaches the reservoir. When the reservoir is full, it extends to within a few hundred feet below the springs. Water released from Stone Reservoir is limited, and additional diversions normally dry the stream up a few miles below the Utah state line (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969).

Because of low precipitation - less than twelve inches per year - most streams in the basin are ephemeral (flowing only after storms) or intermittent (flowing less than 50 percent of the year). Water throughout the basin is mostly appropriated.[12] No water reaches the Great Salt Lake via surface flows, except during extreme flood events (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969).

Peak discharges of streamflows were collected in the Curlew Valley by Idaho State University in the 1960's and 1970's. Peak discharges in Rock Creek near Holbrook ranged from thirty cubic feet per second (cfs) in 1966 to over 1,000 cfs in 1962. The average flow in Rock Creek from September 1970 through August 1972 was about 30 cfs. Flows from Holbrook Springs range from 25 cfs to 35 cfs from data collected in 1932 and again in 1952. Information collected below Stone Reservoir from 1970 through 1972 show flow releases averaged between 6.4 and 8.5 cfs (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969).

No flows were recorded for Deep Creek above Stone Reservoir or South Fork Rock Creek. Current observations estimate base flows in both Deep Creek and South Fork Rock Creek to be less than 1.0 cfs. Flood flows following heavy rain events can exceed 500 cfs (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969; Leffert, personal observations, 1990-2001).

[12] **Appropriated** means the amount of water that may be used by various entities as permitted by State agencies through water rights and other legal methods.

Perennial stream map on this page.

Ground Water Hydrology

Valley fill underlying the main part of Curlew Valley is composed of unconsolidated[13] to semi-consolidated sedimentary deposits and assorted volcanic rocks. Principle aquifers are contained in the valley fill. The surrounding mountains are of slight importance as aquifers but contribute substantial recharge to the valley fill. The valley fill varies in depth around the valley, ranging from only a few feet deep to over 5,000 feet below Stone Reservoir. The fill is nearly 1,000 feet deep in the Holbrook area. Water-bearing beds are found at 800- to1,000-foot depths. Recharge comes from the surrounding mountains and averages about 44,000 acre-feet per year for the entire basin. A significant portion of the total annual aquifer recharge is consumed by irrigation diversions, domestic and irrigation wells and evapotranspiration[14] (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969).

The U.S. Geological Survey investigates ground water aquifers throughout the nation. The Curlew Valley has been identified as an area with significant, or potentially significant, ground water problems and is classified as a "Critical Ground Water Area or Ground Water Management Area subject to State regulations." In the late 1970's, the State of Idaho placed a "non-liftable" or permanent moratorium on withdrawing ground water in the Curlew Valley for any purpose except domestic and livestock use. Studies by the State in the 1970's determined ground water was being consumed faster than it could be recharged and took action to restrict use and preserve the aquifer (Idaho DWR, 1994 and 1999).

The effectiveness of the State restriction on no further major withdrawals on the aquifer has been mixed. Overall, monitoring wells appear to reflect climatic wet and dry cycles, that is, ground water levels generally drop during dryer years and rise during wetter years. Of eleven wells monitored since 1970, six indicate an overall declining trend, one has an upward trend, two have remained essentially constant, and two have no definable trends.

Water Quality

No long-term records of either surface or subsurface water quality are currently available. A gradual decrease in water quality has been observed from north to south (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969). Down valley increases in total dissolved solids, nitrates, phosphates and pesticides are probably due to irrigation returns and the upward movement of more highly mineralized water from the deeper aquifer (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969).

In 1997 and 1998 Idaho Department of Environmental Quality, through section 303(d) of the Clean Water Act (CWA), collected water quality samples in the Curlew Valley watershed to determine compliance with designated beneficial uses. Rock Creek, Deep Creek, Meadowbrook

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[13] **Unconsolidated** means having no specific form or struture.

[14] **Evapotranspiration** is the loss of water from the soil both by evaporation and by transpiration from the plants growing on the soil.

Creek and Sheep Creek were sampled at that time. To date, only one stream, South Fork Rock Creek, has been identified by the State as not supporting beneficial uses and listed as a 303(d) water quality limited stream. Preliminary indications are that sediment may be in excess of State water quality standards in each of the streams sampled, as well as possible bacteria in Sheep Creek (Idaho DEQ, 1998).

As part of the Wolcot Watershed Assessment, South Fork Rock Creek, which flows north toward the Snake River, was identified and listed as not meeting state beneficial use criteria. Subsequently, the stream has been included on the State of Idaho 303(d) list for water quality limited streams, which was approved by the Environmental Protection Agency in October 2000. Total maximum daily loads[15] (TMDLs) have been established by the State of Idaho in an effort to improve water quality that meets designated water quality criteria. TMDLs are discussed further in Chapter 4 in the "Water Quality" section. All landowners, including the Forest Service, are required to comply with these established standards (Idaho DEQ, 1999).

The pollutant identified by the State as limiting the beneficial use of the water in South Fork Rock Creek is sediment. The sources of impairment are listed as: 1) dryland agriculture; 2) irrigated agriculture; 3) rangelands; and 4) forest practices. Irrigated and dryland agriculture contribute to 75-80 percent of the sediment loading of the entire Rock Creek system. The established Total Maximum Daily Load for sediment in the system is 50 milligrams per liter (mg/L) on a monthly average, not to exceed 80 mg/L on any day (Idaho DEQ, 1999).

[15] **TMDL** (Total Maximum Daily Load) is defined as the amount of allowable pollutants generated or deposited into a waterway. TMDLs are established by the State of Idaho and approved by EPA.

SECTION 2- BIOLOGICAL ELEMENTS

Riparian/Wetland Areas

Although riparian and wetland area condition and health are related to watershed function, hydrology, channel condition, and stream morphology, they are also influenced by vegetation conditions on the landscape (Branson, *et al*., 1981). For that reason, riparian and wetland areas are discussed in this section.

Most riparian areas and wetlands in the Curlew Valley area have been modified by human activities. In some areas crop fields have encroached on stream channels, or in some situations, have all but obliterated historic channels. Some channels have been routed around fields in man-made ditches. Other channels that have not been directly modified by man are downcut as a result of altered stream flows and sediment loading. Downcutting has lowered associated water tables, reducing the potential extent, vigor and composition of riparian areas and wetlands. All of these actions have had an effect on the ability of stream channels to provide clean water and adequate aquatic habitat (Leffert, personal observations, 1990-2001).

Surface water is limited throughout the valley. Most springs have been tapped and diverted to provide water for croplands or domestic livestock. These actions have changed the natural flow of seeps and springs, altering the overall hydrologic characteristics of associated wetlands (Leffert, personal observations, 1990-2001). Numerous wells have been drilled resulting in fluctuating water tables (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969). Lower water tables can change the amount of water available for area springs and wetlands by reducing total flows or modifying the timing or duration of flows (Branson, *et al*., 1981).

As a result of these activities, the functioning condition of the riparian and wetland areas throughout the Curlew Valley has diminished. The capacity of stream channels to carry clean water and provide adequate aquatic habitat has decreased. The number and extent of springs and seeps and associated wetlands have been reduced (Leffert, personal observations, 1990-2001). These adverse effects combine to generally categorize the functioning condition of riparian and wetland areas throughout the valley as degraded (USFS, 1998; Wildlife Federation, 1998).

When determining whether a riparian-wetland area is functioning properly, the condition of the entire watershed, including the uplands and tributary watershed system is important. Riparian-wetland health, or "functioning condition," refers to the ecological status of vegetation, geomorphic and hydrologic development along with the degree of structural integrity exhibited by the riparian-wetland area. A healthy riparian-wetland area is able to adjust to and handle increases in stream flow or snowmelt runoff with minimal disturbance to the stream channel and associated riparian-wetland plant communities.

Assessment of riparian-wetland condition is subdivided into three components:

1. Hydrology of the riparian-wetland area

2. Area vegetation type, condition, and vigor
3. Erosional or depositional features.

A properly functioning area is one that can dissipate stream energy, filter sediment, improve floodwater retention and ground water recharge, and develop vegetation that helps stabilize streambanks and water quality. A "functional-at-risk stream may display all the characteristics of a Properly Functioning Condition area but will have at least one assessment attribute that may have a probability of degradation association with a high flow event. For example, the system may currently be functioning properly, but a downstream headcut has the potential to move upstream into the assessed area, which in turn could create an unstable, or non-functional condition. Non-functional riparian-wetland areas clearly lack healthy hydrologic, vegetation and/or erosional or depositional features associated with functional systems (USDI-BLM, 1998).

The Bureau of Land Management (BLM) assessed Sheep creek, Meadowbrook, North Canyon and Wood Canyon creeks for riparian properly functioning condition. Sheep creek was found to be properly functioning in the upper reaches and nonfunctional in the lower reaches. Meadowbrook Creek was found to be functioning-at-risk. North Canyon was found to be functioning, functioning-at-risk and nonfunctional, depending on individual stream reaches assessed. Wood Canyon Creek was found to be functioning-at-risk (BLM, 1994).

The majority of stream reaches evaluated have been rated as "nonfunctioning, although some stream reaches are considered to be properly functioning or functioning at risk" (See Table 3.35). Nonfunctioning reaches normally do not contain sufficient in-stream habitat features, such as pools, riffles and substrate suitable for fish spawning or aquatic life, reducing the potential for viable fish and aquatic populations within these channels (USFS, 1998; BLM, 1994).

Photograph taken of Deep Creek dewatered form irrigation withdrawal 1999.

Meadowbrook Creek above the road crossing in Section 17.
The channel has been downcut and is re-stabilizing at a lower level.

Vegetation Cover Types

The Grassland falls into the true "sagebrush steppe" vegetation type. This vegetation type covers the northern portion of the Intermountain region where sagebrush is co-dominant with perennial bunchgrasses. "Sagebrush steppe" or "shrub steppe" includes a significant component of native grass. Most of the Grassland is comprised of sagebrush along with other vegetation types, including mountain brush, Utah juniper, Desert Salt shrub, quaking aspen and riparian communities. Approximately 75 percent of the area administered by the Forest Service has been modified through the introduction of non-native species.

Table 3.5 displays the natural or potential vegetation cover on the Grassland.

Table 3.5. Vegetation Cover on the Grassland

Vegetation Cover	Acres	Percent of Acres
Sagebrush	45,150	95%
Mountain brush	1,360	3%
Minor Vegetation Including Riparian areas	1,090	2%
TOTAL	**47,600**	**100%**

Sagebrush

It is important to differentiate between sagebrush species and subspecies in order to classify rangeland types. Understanding site potential, palatability to livestock and wildlife, and response to fire are important factors in managing vegetation. A wide variety of vegetation community types exist within the sagebrush landscape – the result of differences in soil, climate, topography

and other physical processes. Understory vegetation in these communities differs widely. Historic evidence indicates that sagebrush was widespread and dominant prior to European settlement, and the boundaries of sagebrush habitats have not changed over time (Branson, 1985; Johnson, 1984; Vale, 1975).

When compared with historical photos, sagebrush communities today and their role in ecological history suggest that sagebrush has a direct site-specific reaction to the use and management imposed on it during European settlement. Whether sagebrush increases, decreases, or remains stable is a function of both the kind of use and site characteristics (Johnson, 1984).

Little doubt exists that shifts in composition and relative density of both herbaceous and woody species have taken place on most sites. The degree of change is subject to the kind of use and site characteristics. While it is clear that changes in sagebrush density have occurred, it is equally clear no major shifts in sagebrush distribution have occurred as a result of use. In other words, the rangeland types are considered stable. No basis exists for assuming that much of the big sagebrush distribution is a disclimax or a seral stage toward grassland (Johnson, 1985; West, 1999).

Although major change has occurred locally as a direct result of wildfire suppression, conversion to agricultural land use, and production of livestock forage through non-native seedings, the sagebrush type remains essentially the same. This is an important concept for the Grassland. The entire Grassland is within the area considered a true "sagebrush steppe" ecosystem (West, 1983).

Table 3.6 displays the relative differences between the different sagebrush communities on the Grassland. Sagebrush "X" is an undescribed variation of big sagebrush that occurs along the shoreline of the ancient Lake Bonneville. It is similar in most ways to Wyoming big sagebrush (*Artemisia tridentata vaseyana*). Ground cover on these sites is also similar to Wyoming big sagebrush sites, averaging approximately 60 percent. Sagebrush "X" is less dense than basin and mountain big sagebrush and can reach canopy cover of between 22 and 25 percent (Winward, pers. comm., 1999). Because of its growth form, it is valuable for some wildlife species.

Mountain Brush

Mountain brush is important for biodiversity and wildlife habitat. It offers the most variety of shrubs, such as chokecherry (*Prunus virginiana*), serviceberry (*Amelanchier alnifolia*), currant (*Ribes* sp.), mountain snowberry (*Symphoricarpos oerophilus*), and elderberry (*Sanbucus glauca*) intermingled with sagebrush in the overstory. These shrub species may occur alone and form distinct types or may occur in a mixed composition. All of these mountain brush species resprout after fire and generally prefer slightly higher moisture regimes of 14 to 16 inches of annual precipitation (Shiflet, 1994).

Mountain brush is found in ecological settings that are slightly more moist than sage-brush settings and slightly drier than quaking aspen sites. The mountain brush cover type is found usually on north and east aspects and slopes. This heterogeneous community provides important habitat diversity within the landscape, and a variety of herbaceous understory species provides needed ground cover to help maintain watershed values (Shiflet, 1994).

Table 3.6. Differences Between Sagebrush Communities Found on the Grassland

From: Rangeland Cover Types of the U.S., SRM, 1994

Sagebrush type	Overstory	Understory	Structure	Annual Production	Soils	Influences	Climate	Elevation	Distrubance Results	Rehabilitation
401 Basin Big Sagebrush	Basin big sagebrush, with minor amount of Rubber and Green rabbitbrush	Yarrow, milkvetch, onion, balsamroot, hawksbeard, pussytoes, agoseris, fleabane biscuit root, lupine, phlox, wheatgrass, bluegrass, squirreltail, needle-and- thread.	Shrub layer is fairly tall (>40 in.), fairly open. Shrub stand comprises about 20% of annual production by weight, perennial grasses about 60% and forbs about 20%. More than 50% of ground surface is bare; 25%-30% is covered by litter; 10% covered by cryptograms.	700-1,900 pounds per acre	Deep, productive, permeable	Crop production, livestock grazing	8-14 in. of precipitation with 40% in growing season (water storage from precipitation is key)	<7,000 feet	Loss of understory due to livestock grazing resulting in increased density and vigor of sagebrush. Where annuals are present, increased susceptibility to burning.	Deep productive soils allow good perennial recovery. Susceptibility to fire. Reestablishes from seed.
402 Mountain Big Sagebrush	Mountain big sagebrush, small amounts of Bitterbrush, green rabbitbrush, gray horsebrush	Bluebunch wheatgrass, sandberg bluegrass, junegrass, onion grass, western needle grass, yarrow, milkvetch, balsamroot, hawksbeard, buckwheat, Aven, biscuitroot, lupine, phlox, groundsel.	Shrub stand of medium height (35-40 in.), fairly dense, shrubs comprise 25%-30% annual production, grasses 40%-50%, forbs 25%. High litter cover, low cryptogram cover.	1,000-2,500 pounds per acre	Moderate to deep, may have high content of rock and gravel; well-drained. Rough topography leads to increased erosion hazard.	Livestock and wildlife grazing	14-18 in. of precipitation. Major growth is late March through June.	3,500 feet to 9,000 feet	Loss of palatable grasses and forbs due to grazing which results in increased density and vigor of sagebrush.	Easily killed by fire; reestablishes from seed and forms dense stands.
404 Threetip Sagebrush	Threetip sagebrush, green rabbitbrush, gray horsebrush	Wheatgrass, bluegrass, June-grass, needle-and-thread, pussytoes, milkvetch, Indian paintbrush, hawksbeard, fleabane, buckwheat, lupine, biscuitroot, phlox, deathcamas.	Shrub layer low height (18-24 in.). Composition by weight averages 22% shrubs, 60% grasses, 18% forbs. Ground cover is high in litter and bare ground. Low in surface rock/gravel and cryptograms.	450-1,100 pounds per acre	Shallow and/or more gravelly than for Mountain big sagebrush	Livestock grazing	12-16 in. of precipitation. Cool, moderately moist sites.	4,000 feet to 9,000 feet	Shrub cover thickens under heavy grazing. Understory replaced by less palatable species. Fire is the probable cause of mixed stands with Mountain big sagebrush.	Will sprout from shallow lateral roots. Regenerates after fire or herbicide treatments.
405 Black Sagebrush	Black sagebrush, green rabbitbrush	Wheatgrass, bluegrass, squirreltail, Indian ricegrass, needle-and-thread, milkvetch, Indian paintbrush, fleabane, goldenweed, Lomatium, phlox.	Shrub layer low height (12-20 in.). Percent composition by weight is 35% shrubs, 45%-50% grasses, 15%-20% forbs. Low in litter; 70% gravel or bare.	350-500 pounds per acre	Droughty, coarse-textured, usually calcareous, shallow over silica hardpan or deeper with extreme gravel subsoil.	Livestock grazing in spring, fall and winter. Antelope grazing year-round.	8-16 in. of precipitation. Overlaps with Big sagebrush occurrence. Depends on soils.	Middle elevation. Very short growing season; limited soil moisture in spring.		Slow natural recovery. Potential for artificial revegetation is low.

Other Minor Vegetation Cover Types (USDA-FS, 1998)

Utah Juniper

Utah juniper (*Juniperus osteosperma*) comprises less than 90 acres (0.2 percent) on the Grassland. Juniper has not encroached into adjacent cover types. The distribution of age classes is skewed toward middle and older ages. Shrub, forbs and grass components are sparse on rocky soils with approximately 30 percent bare ground.

Salt Desert Shrub

Salt Desert Shrub community comprises about 150-200 acres (0.3 percent) of the Grassland and is found northeast of the Curlew Campground. This shrub species occurs on alkaline soils that can form chemical crusts. Productivity in this cover type is considered low. Greasewood (*Sarcobatus vermiculatus*) is the dominant overstory shrub and occurs with four-wing salt brush (*Atriplex canesence*) and rabbitbrush (*Chrysothamnus nauseosus*). Greasewood is restricted in distribution to deep soil conditions (greater than sixty inches) with a high pH and alkaline content and high water table. Understory vegetation is naturally sparse. Microbiotic crusts may be present and may cover the soil surface under greasewood plants or even spread into the space between plants.

Quaking Aspen

Quaking aspen (*Populus tremuloides*) appears on an estimated five acres (0.01 percent) of the Grassland and appear to be within their natural range. It is found in isolated clones in the Salyer, Twin Springs, and South Lookout Mountain areas on BLM-administered land. These sites are considered at the edge of their ecological range due to sustained high summer temperatures and semiarid conditions. Quaking aspen areas are comprised of mature trees with no understory regeneration (suckering).

Vegetation map on this page.

Natural Disturbances in Vegetation Cover Types

The Role of Fire

Fire is a natural and vital ecosystem process (White and Pickett 1985) and is necessary for sustaining the ecosystems on the Grassland. Fire serves many roles in the ecosystem including reducing biomass, recycling nutrients, regenerating vegetation, and maintaining diverse landscapes (Kozlowski and Ahlgren, 1974; Parsons, 1978).

The Curlew National Grassland is not considered a "true" grassland at all; rather it is a sagebrush steppe ecosystem (Collins and Harper, 1982; McMahon, 1985). Sagebrush steppe ecosystems evolved under the influence of herbivory and fire. Prior to settlement by EuroAmericans, climatic fluctuations, periodic cycles of overgrazing and undergrazing, and lightning fires and aboriginal burning combined to form a region vegetated largely by sagebrush with a perennial grass understory (Burkhardt, 1991). Fire is a natural, and common, component of sagebrush steppe ecosystems, and any site that is capable of developing vegetation dense enough to carry a fire has undoubtedly burned many times in the past (Blaisdell, *et al.*1982; Clark and Starkey, 1990).

As the Curlew Valley was settled beginning in the 1860's, the ecosystem was subjected to chronic, intensive grazing by domestic livestock. This removed the fine fuels in the understory and greatly diminished the role of fire in the ecosystem (Clark and Starkey, 1990). Later, much of the Grassland was converted to agriculture. After the abandonment of agriculture in the 1930's and the establishment of the National Grassland in 1960, a period of less-intensive grazing and active fire suppression has continued to the present, which has prolonged the alteration of the historic fire regime.

In the early 1900's, particularly after the dramatic wildfires of 1910 in northern Idaho and Montana, public concern for protection from forest fires brought about an era of aggressive fire suppression on public lands. The trend has continued to this day, with the effectiveness of suppression increasing greatly with the advent of aerial capabilities and improved road access in the years following World War Two (Pyne, 1982). Effective fire suppression has led to the majority of the vegetation on the Grassland in the mature and old age-classes (Table 3.7).

Table 3.7. Estimated Percentages of Sagebrush in the Mature and Old Age-Classes

Canopy Cover Class	Seral Stage	Percentage
16-25%	Late	42%
> 25%	Late	17%

Source: Caribou National Forest 2000, GIS data, based on Prevedel, 1997.

Historic Fire Regime

Historic fire regimes are generally based on the *habitat type* (Daubenmire 1952; Daubenmire 1970; Hironaka *et al.*, 1983) or potential natural vegetation. Habitat types on the Grassland are primarily dominated by sagebrush and mountain brush. These sites are predominantly big

sagebrush interspersed with rabbitbrush , and several grasses, such as bluebunch wheatgrass (*Agropyron spicatum*), needle-and-thread (*Stipa comata*) and forb species, such as western yarrow (*Achillea millefollium*), lupine (*Lupinus* sp.).

Sagebrush is the potentially dominant vegetation on approximately 95 percent of the Grassland (Caribou-Targhee National Forest, 2000). Three types of sagebrush, basin big sagebrush, sagebrush "X", and mountain big sagebrush, are dominant on 89 to 92 percent of the Grassland (Collins and Harper, 1982; Winward, pers. comm., 2000), and are generally distributed based on site characteristics including soil depth, precipitation, and insolation.[16] The natural vegetation communities of the Curlew National Grassland generally fall within a single fire regime, that of basin big sagebrush and mountain big sagebrush which surround the other communities. This fire regime is described as frequent, stand-replacement fires that are estimated to occur on a twenty- to forty-year interval.

Big sagebrush species are not fire-resistant and are easily killed by wildfire. Big sagebrush, particularly mountain big sagebrush, generally stores seeds in the soil, which germinate as a result of fire-induced heating (Bradley, 1992). Depending upon climatic conditions and grazing patterns, big sagebrush usually requires fifteen to thirty years before returning to pre-fire levels (Blaisdell, *et al.*, 1982; Bunting, *et al.*, 1987). Rabbitbrush (*Chrysothamnus nauseosis*) and three-tip sagebrush (*Artemesia tripartita*), as well as grasses and forbs, are scattered within these communities. Unlike big sagebrush, rabbitbrush and three-tip sagebrush both typically sprout prolifically following a fire. Most grasses and forbs sprout readily and dramatically increase their abundance following a fire. Mountain brush shrub species and three-tip sagebrush also typically sprout readily following a fire.

Fire history for this group is generally lacking. Barrett (1994) estimated a mean fire return interval of nineteen years for sagebrush-grasslands and mountain brush on the Caribou National Forest. Houston (1973) found the fire return interval to be twenty to twenty-five years for sagebrush in Yellowstone National Park. Interior Columbia Basin Ecosystem Management Project used twenty to thirty years as the fire return interval for mountain big sagebrush (Quigley, *et al.*, 1999). Fire frequency was estimated to be twenty to forty years for mountain big sagebrush on the Caribou National Forest (1997), and ten to thirty years on the Bridger-Teton National Forest (1997). The fire return interval for basin big sagebrush and mountain big sagebrush on the Curlew National Grassland was estimated to be twenty to forty years (Caribou National Forest, 1998).

Wildfire Hazard

The Properly Functioning Condition assessment for the Curlew National Grassland found that both the sagebrush and mountain brush ecosystems exhibit a high degree of departure from the historic fire regime (Caribou National Forest, 1998). Based on available data, **the wildfire hazard is estimated to be moderate** due to the amount of late-seral sagebrush on the Grassland (Table 3.8). The wildfire hazard rating provides a relative measure of the potential of uncharacteristically large wildfires. The hazard rating is directly related to changes in vegetative

[16] **Insolation** means the amount of solar radiation that has been received; the rate of delivery of all direct solar energy per unit of horizonal surface.

conditions including species composition, structure, and density. This qualitative rating was developed by comparing the amount current amount of vegetation in mature and old age-classes (*i.e.,* late-seral stage) to the amount in mature and old age-classes estimated to have occurred under the historic fire regime.

Table 3.8. Estimated Percentages of Sagebrush Canopy Cover Classes and Seral Stages

Canopy Cover Class	Seral Stage	Percentage
0-5%	Early	17%
6-15%	Middle	24%
16-25%	Late	42%
> 25%	Late	17%

Source: Caribou National Forest 2000, GIS data, based on Prevedel, 1997

Fire History

Greater Curlew Valley Area

Historically, fire played an important role in the Greater Curlew Valley Area (GVCA). Fire is a natural, and common, component of sagebrush steppe ecosystems, and any site that is capable of developing vegetation dense enough to carry a fire has undoubtedly burned many times in the past (Blaisdell, *et al.,* 1982; Clark and Starkey, 1990). The annual acreage that historically burned in the GVCA is estimated to be approximately 14,000 to 17,000 acres, on average. Since the Curlew Valley was settled, however, most of the natural vegetation has been altered by farming and grazing, and affected by fire suppression. The BLM and the Forest Service have had a policy of aggressively suppressing wildfires within the GVCA to protect public safety and private property on adjacent and intermingled lands. The following information is based on the occurrence of wildfires larger than 100 acres in the GVCA from 1960 to 1999 (See Fire Process Paper in the Project File.)

In the Greater Curlew Valley Area there have been twenty-three wildfires larger than 100 acres since 1960 that have burned approximately 85,430 acres on private, Grassland, and BLM-administered lands. The fires have ranged in size from approximately 300 acres to approximately 21,000 acres before they were extinguished. Thus, in the past forty years wildfires have burned approximately thirteen to fifteen percent of the area of the GCVA that is estimated to have burned under historic conditions.

In the Greater Curlew Valley Area much of the area that is potentially dominated by big sagebrush has been converted to agricultural production on private land, and the sagebrush communities that remain have a fragmented distribution. The Properly Functioning Condition (PFC) assessment for the Grassland found that the sagebrush communities in the GCVA exhibit a high degree of departure from historic conditions due to conversion of sagebrush to agricultural land or pasture, livestock grazing, and fire suppression (Caribou National Forest 1998, 1999). The PFC assessment found that the sagebrush communities are “functioning-at-risk” in the GVCA, with an abundance of early-seral conditions, and too little mid-seral and late-seral sagebrush mostly due to the conversion of sagebrush to agricultural production on private land. These conditions are projected to continue into the future in the GVCA, and fire suppression

within the sagebrush communities on public lands is also expected to continue to protect public safety and private property on adjacent and intermingled lands.

Curlew National Grassland

Historically, fire played an important role in the Curlew Valley and on the Curlew National Grassland. Fire is a natural, and common, component of sagebrush steppe ecosystems, and any site that is capable of developing vegetation dense enough to carry a fire has undoubtedly burned many times in the past (Blaisdell, *et al.*, 1982; Clark and Starkey, 1990). The annual acreage that historically burned on the Grassland is estimated to be approximately 1,500 acres, on average. Tthe annual acreage increases to approximately 2,500 acres within the proclaimed Grassland boundary. Since the Curlew Valley was settled, however, most of the natural vegetation has been altered by farming and grazing, and affected by fire suppression. The Forest Service has had a policy of aggressively suppressing wildfires within the proclaimed boundary of the Grassland (approximately 75,000 acres) to protect public safety and private property on adjacent and intermingled lands. The following information is based on fire occurrence within the proclaimed Grassland boundary from 1960 to 1999 (See Fire Process Paper in Project File.)

Since 1960 eighteen lightning-caused wildfires and seven human-caused wildfires have burned approximately 3,050 acres on the Grassland, including acreage on private property within the proclaimed Grassland boundary. These wildfires have ranged in size from less than 1 acre to approximately 620 acres before they were extinguished. From 1960 to 1999 the annual acreage burned by wildfire on the Grassland, from both lightning and human causes, has been approximately 76 acres, on average. Thus, in the past forty years wildfires have burned approximately three to five percent of the area of the Grassland that is estimated to have burned under historic conditions.

Since 1960 the total acreage on the Grassland that has burned from all causes is approximately 13,030 acres, including acreage burned on private property within the proclaimed Grassland boundary. Thus, in the past forty years fires from any source have burned approximately thirteen to twenty-two percent of the area of the Grassland that is estimated to have burned under historic conditions.

On the Grassland, grazing and effective fire suppression have led to large areas of sagebrush that are older and have a denser canopy than they would under the influence of historic fires. Mid seral sagebrush in the 6-15 percent canopy cover is the least represented component. When big sagebrush reach a canopy density greater than 15 percent they begin to compete aggressively with the herbaceous species in the understory, putting the ecosystem at risk of losing diversity, particularly grasses and forbs (Winward, pers. comm., 2001). The denser sagebrush canopy also puts the communities at risk of fires that are larger than they would be under the historic fire regime. The sagebrush communities are projected to continue to experience the effects of wildfire suppression on the Grassland, which is deemed necessary to protect public safety and private property on adjacent and intermingled lands.

Mormon Crickets

The Mormon cricket is a gregarious, wingless, long-horned grasshopper found in most of the western states. It occurs mainly in broken mountainous country with sagebrush and native grass vegetation. The insect is found every year in these habitats and occasionally increases in population, to the point where migration occurs into cultivated areas causing crop damage. Outbreaks are known to last 2 to 6 years or until controlled by man, predators, or weather conditions. This cycle of outbreaks has occurred since the first record of cultivation in the West (Haus, 1982; Rangeland Grasshopper EIS, 1987; Cowan, 1929).

Mormon crickets are omnivorous, opportunistic feeders. They prefer flowerheads and seeds to green vegetation, just the reverse of grasshoppers. Diet changes shift in the summer as the need occurs for more protein during mating and egg production. Crickets will shred leaves on young wheat plants, feed on the succulent florescence just prior to emergence at the plant boot stage, and remove the wheat kernels from the seed heads of older plants (Rangeland Grasshopper EIS, 1987.

Mormon cricket infestations are often so extensive that individual land managers alone cannot control them. The Rangeland Grasshopper Cooperative Management Program, Animal and Plant Health Inspection Service (APHIS) responds to economically critical levels of infestation by implementing chemical and/or biological control treatments. From 1990-1994, on and adjacent to the Grassland, it became necessary to control Mormon crickets with carbaryl bait applied under APHIS supervision. While vegetation damage from Mormon crickets on the Grassland was minimal, impacts to adjacent agricultural crops was greater. Since 1994, weather has kept Mormon cricket populations under control. The amount of damage done by Mormon crickets throughout the West is surpassed by that of other insects. The suddenness and severity of the attacks and great numbers of insects in bands is what makes the cricket problem so spectacular.

Not capable of flight, the cricket is prey to many birds, rodents and small mammals. Birds are known to be a common predator of crickets. Jays, meadowlarks and magpies have been observed digging and eating the eggs. Gulls have been observed feeding on crickets on summer fallow ground but not in standing wheat or in sagebrush. Kangaroo rats, black wasps and round worms also are predators of the cricket eggs (Haus, 1982; Cowan, 1929).

Grasshoppers

Grasshoppers are insects with chewing mouthparts. They are divided into two major groups: the short-horned or long-horned grasshoppers (short- and long-horned refer to the length of the antennae.) The long-horned include locust and Mormon Crickets. The short-horned is generally the group most people recognize as common grasshoppers. The short-horned grasshoppers include most of the injurious species of public concern. Three subfamilies of short-horned grasshoppers are found in the Grassland, including the slant-faced, the band-winged, and spur-throated grasshoppers. The slant-face, as the name implies, generally has an angled face and a long, thin body that enables it to blend into the grassy vegetation of which they are generally associated. The banded-wing is the conspicuous hopper with brightly colored hindwings that snap and crackle as it flies short distances. The spur-throat subfamily includes most of the

injurious species, including the red-legged grasshoppers. Their name derives from the tubercle projecting between their front legs (Haus, 1982).

Most grasshoppers in the Grassland area produce one generation each year. Eggs in most species are laid in the soil in summer and fall and hatch the following spring. The immature grasshoppers (called nymphs) typically pass through five stages before becoming reproductive, mature adults. It is during the fourth and fifth stages of development that grasshoppers become most voracious and cause the most economic damage. When grasshoppers occur in large numbers, more than eight per square yard, the USDA Animal and Plant Health Inspection Service (APHIS), generally begins a program of eradication, including public lands. Private landowners also often receive assistance from APHIS in eradication or control efforts (Haus, 1982; Rangeland Grasshopper EIS, 1987).

Grasshopper outbreaks have been characteristic of the Grassland area, even before pioneers settled the area. Given their frequency and intensity, grasshopper outbreaks probably played important roles in maintenance of natural ecosystems. Such outbreaks now can pose major short-term economic problems for private landowners. On the other hand, the consequences of large-scale control programs against grasshoppers, if engaged in too frequently, may inadvertently lead to more frequent outbreaks, because natural enemies are reduced through treatment along with their prey. Recent analyses of grasshopper outbreaks in Wyoming and Montana lend support to this concern.

Grasshoppers are often depicted as indiscriminate feeders; however, individual species show marked preferences for certain kinds of plants. As a broad generalization, slant-faced grasshoppers feed primarily on grasses; spur-throats feed primarily on forbs; and winged-bands have intermediate feeding habits. These diets are reflected in the basic morphology of the grasshoppers' mouthparts. Grasshoppers are one of the most conspicuous insects to inhabit the Grassland and are viewed by many as the most injurious to crops and rangelands. It is critical in assessing the potential for economic damage to identify the species involved when large grasshopper numbers occur in rangeland and cropland (Haus, 1982; Rangeland Grasshopper EIS, 1987).

Grasshoppers become important in the diet of juvenile sage grouse at around six weeks of age (Klebenow and Gray, 1967; Peterson, 1970). Grasshoppers are also important in the diet of other species, such as sage thrashers, Brewers sparrows, loggerhead shrikes and long-billed curlews (Paige and Ritter, 1999).

Human Caused Disturbances in Vegetation Cover Types

Humans play an important role is shaping the landscape. The following section discusses how human activities have affected the Grassland.

Fire Management

The fire management program on the Curlew National Grassland has two broad purposes:

1. To protect and enhance Grassland resources through wildfire prevention, fuel reduction, prescribed fire, and by applying the appropriate management response to all wildland ignitions;

2. To meet Grassland goals and objectives with the use of prescribed fire.

All wildland fires receive the appropriate suppression response. The decision to use a particular suppression tactic depends on many factors including threats to life, property, and investments; weather conditions; fuels; terrain; and the availability of firefighting personnel and equipment.

Although fire is a natural ecological process, it differs from insects and diseases in that fire is *intentionally* used a tool to manage natural resources. The use of prescribed fire has become more prevalent since 1980. Since 1960, fourteen prescribed fires have occurred on about 10,000 acres. The purposes of the treatments have been to remove sagebrush overstory in preparation to eliminate bulbous bluegrass (*Poa bulbosa*) in the understory and to reduce sagebrush density on crested wheatgrass seedings. Treatments have been designed to improve diversity in the herbaceous understory, provide a more diverse mix of sagebrush canopy cover classes, to increase forage production, to improve wildlife habitat, and to reduce hazardous fuels. Prescribed fires have affected a relatively modest portion of the Grassland, averaging approximately 500 acres annually since 1980.

Urban Wildland Interface

The urban wildland interface is defined as areas where humans and their development meet or intermix with wildland fuels. Interface may include expanding urban areas, far-flung subdivisions, isolated cabins, or infrastructure developments, such as power lines, linking urban areas. Development on private lands on and adjacent to the Grassland is a legacy of the settlement history of the Curlew Valley prior to the establishment of the Grassland. Thus, the Grassland has always had the characteristics of an interface area.

The presence of development adjacent to wildland fuels affects fire management decisions by narrowing the fire management options in interface areas due to concerns that fire may threaten private developments. The costs of fire suppression are often higher in interface areas, and the ability to manage vegetation is often reduced. The risk of human ignitions also increases as development increases in interface areas. In the "National Fire Plan," the Secretaries of Agriculture and Interior (2000) prioritized reducing the risk of wildland fires near interface communities as part of an overall framework for fire management and forest health programs.

Due to the intermixed land ownership patterns on and adjacent to the Grassland, the entire Grassland is considered to be an urban wildland interface area. For this reason the use of wildland fire use[17] is considered inappropriate. All wildland fires on the Grassland will be aggressively suppressed.

[17] **Wildland fire use** is the management of naturally ignited wildland fires to accomplish specific, prestated resource management objectives in predefined geographic areas outlined in Fire Management Plans.

The importance of safeguarding interface areas will continue to grow as population increases and more development occurs adjacent to wildlands. However, federal agencies only have authority and responsibility for the protection of resources and investments on federal lands.

Prescribed Fire

Since 1960, fourteen prescribed fires have occurred on the Grassland beginning around 1980 to the present day. These man-ignited fires were used to treat approximately 9,990 acres of vegetation to remove the sagebrush overstory in preparation to treat bulbous bluegrass in the understory, to provide more herbaceous diversity and a more diverse mix of sagebrush seral classes, to increase forage production, to improve wildlife habitat, and to reduce hazardous fuels, (See "Fire Management Section" under Human-Caused Disturbance for discussion.)

Noxious Weeds

Noxious weeds occur at low frequencies on the Grassland. Documented weed species include Canada and musk thistle, black henbane, leafy spurge and diffuse knapweed. Depending on the species, populations are either static (Canada thistle, musk thistle and black henbane) or declining under intensive treatments (leafy spurge and diffuse knapweed). These infestations are apparently being spread mostly by vehicles, because they occur along road edges and other travelways.

Practices for managing these populations include herbicide application and physical removal by hand. Direction for noxious weed management is provided in the 1985 Forest Plan and the 1996 Caribou National Forest Noxious Weed Strategy Environmental Assessment. A less than one-acre infestation of diffuse knapweed and two patches of less than one acre of leafy spurge have been treated annually using Tordon and 2,4-D herbicides. Small patches of Canada and musk thistle have been removed by either chemical treatment or by hand grubbing along some roadways and near Sweeten Pond. Black henbane usually occurs along disturbed roadways and has not received any treatments. Approximately 60 acres of black henbane occurs along 12 miles of roadways in Sheep Creek and in North and South 13 fields. Leafy spurge is confined to two small patches in the West Hunsaker field. Diffuse knapweed is confined to one small patch on the Twin Springs Campground loop road.

Other Invasive Species

In 1999 the President of the United States signed Executive Order 13122 "to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological and human health impacts that invasive species cause…" Invasive species are those species that are not native to a particular ecosystem and are or are likely to cause economic or environmental harm or harm to human health (E.O. 13112).

Duties of Federal managers include identifying actions that could result in affecting the status of invasive species, preventing their invasion, controlling such populations, providing for restoration of native species and habitat conditions, conducting research and providing public education. They also "will not authorize, fund or carry out actions" which are likely to spread or increase invasive species.

The greatest threat of an invasive species on the Grassland appears to be cheatgrass. Harrison, *et al*, 1994 state that crested wheatgrass and other species, such as bulbous bluegrass, both of which developed in semi-arid regions of Eurasia, are effective in successfully competing against "unintentionally introduced taxa, such as cheatgrass and Russian thistle." Threats also occur from plants like Russian thistle (*Salsola kali*) and halogeton (*Halogeton afomeratus*), but these are relatively small.

Seedings

With the arrival of settlers and livestock, sagebrush was burned off to produce more grass and to clear the land for farming. Where native grasses were lost, many areas were seeded to crested wheatgrass or other introduced species to provide livestock forage. As the lands in Curlew Valley came under federal management, many acres were stabilized by planting to non-native forage species to provide grazing opportunities for cattle from adjacent private lands and farms. Records on file from 1950 indicate that bulbous bluegrass, crested wheatgrass, ladak alfalfa, Whitmar wheatgrass and yellow sweetclover were species commonly planted on the Grassland with crested wheatgrass predominating.

Approximately 35,500 acres have undergone some type of seeding treatments, and some of these acres have been treated more than once. These introduced species appear to have reached a stable community in equilibrium with environmental conditions. This appears to be one of the thresholds, hypothesized by Friedel (1988), which is relatively stable unless additional pressure or release from pressure is applied. Even removing livestock may not change this community over the planning horizon of fifty to one hundred years. Secondary succession[18] may be on a pathway yet unknown or may be too slow to meet management needs.

Bulbous bluegrass (*Poa bulbosa*)

Bulbous bluegrass is a grass species indigenous to Eurasia that was planted on Bankhead-Jones lands by the Soil Conservation Service as part of early rehabilitation programs to stabilize soils. It was generally part of a seed mixture that included crested wheatgrass and Ladak alfalfa. Occasionally, Whitmar wheatgrass and yellow sweet clover were added to the mix (Handy, 1950). At that time, bulbous bluegrass was a relatively new species and very little was known about it. It showed great promise for becoming established and providing good ground cover.

Bulbous bluegrass is widespread in the Great Basin and adaptive to areas receiving favorable spring and fall precipitation. It is found at elevations from 2,000 to 6,000 feet. Bulbous bluegrass survives well on dry, well-drained soils that are low in organic materials (Harrison, *et al*., 1994.) It is an early spring grower that quickly dries up and becomes dormant during the dry hot summer. During the early spring growing season, bulbous bluegrass, if frozen after growth starts, will die back and not recover until the following spring (K. Timothy,

[18] **Succession and Secondary Succession** is the progressive replacement of plant communities on a site which leads to the potential natural plant community; i.e., attaining stability. Primary succession entails simultaneous successions of soil from parent material and vegetation. **Secondary succession** occurs following disturbances on sites that previously supported vegetation, and entails plant succession on a more mature soil.

pers. comm., 1999). It grows from bulbs but also produces reproductive bulblets in the flowering head and true seeds. Any of these three reproductive methods can produce new plants, depending on growing conditions (Harrison, 1996).

This species is persistent, highly competitive, and easily regenerates itself. It is aggressive and readily invades disturbed areas and can cause problems on croplands. Often, it becomes a dominant species on disturbed areas and may persist as a monoculture once it establishes. It is considered an undesirable species because of its short growing period, its competitiveness, and its lack of and limited vegetative production (Harrison, 1996).

Research on bulbous bluegrass competitiveness is mixed. On some sites in Oregon and Washington it may serve as an early successional species, replaced by longer-lived perennials. It seldom dominates a site unless a disturbance occurs. It also seems to persist under grazing pressure. Several seeded plots have not persisted and were replaced by surrounding introduced forage grasses (Harrison 1994 and 1996).

Harrison (1996) found that bulbous bluegrass is extremely aggressive and has invaded the valleys and foothills of the Grassland. It is particularly competitive in areas where soil receives eight to ten inches of annual precipitation and where the soil dries in July and August. It volunteers and is adaptive to the winter rainfall zone. Stands may fluctuate from year-to-year. It often persists in mixtures of long-lived bunchgrasses from which it may invade nearby areas and croplands.

The species can be used as forage for livestock early in the season when it is green and growing, but its limited growth makes this use short-term. Production on bulbous bluegrass sites average about 500 pounds per acre per year (K. Timothy, pers. comm.). Due to its limited and early growth, it provides little value as forage for wildlife species (Harrison, 1994).

Treatments to eliminate bulbous bluegrass require five or six years of non-use from livestock grazing, depending on moisture conditions. An experimental method of treatment developed in cooperation with the USFS, Intermountain Region, Regional Ecologist requires burning the area, plowing, and reseeding. Prior treatments are listed in the 2240 files in the Malad Office of the Westside Ranger District. (See bulbous bluegrass map on page 3-44.)

Bulbous bluegrass treatments require one year of non-use prior to treatment to increase fuel loads to carry the prescribed fire. The treatment method includes burning, plowing to bury the bulbs, and reseeding. One to two years of summer fallow is required to kill the bulbs and for moisture to be held in the soil. Generally, the cost to eradicate bulbous bluegrass is approximately $50 to $60 an acre. To reduce the cost per acre of treatment, an agriculture crop (generally wheat) is planted during the third or fourth year. This crop subsidizes the cost of plowing, thereby reducing the cost of treatment somewhat. After the crop has been harvested, two growing seasons are necessary to allow new seedlings to become established before grazing resumes. Historically, treatments of bulbous bluegrass on the Grassland have been reseeded with non-natives, primarily for soil and watershed stabilization and for livestock forage.

Bulbous bluegrass map goes here

Crested Wheatgrass

Crested wheatgrass, also a native of Eurasia, is one of the most successful of all grasses introduced into the sagebrush-grass ecosystem of the Columbia Basin. It was the first successful species seeded in sagebrush-grass sites in southern Idaho and continues to be one of the best-adapted species. Its attributes include wide adaptation to soil and climates, long life, drought and cold resistance, relative freedom from disease, good productivity and palatability, persistence under abuse, good competitive ability, high seed production, easy establishment and excellent seedling vigor. It produces from three to twenty times the grazing capacity of native plants it has replaced. It sustains heavy and long, or even continual, grazing and has the ability to survive severe droughts. Early seedling root development and seedling ability to tolerate widely fluctuating moisture and temperature conditions contribute to the ease of its establishment (Harrison, *et al*., 1994; Kindschy, 1994).

High grazing tolerance on crested wheatgrass sites has been attributed to early root-growth activity, early accumulation of leaf tissue, and early accumulation of carbohydrate reserves in underground parts. The crested wheatgrass root system has the ability to grow at colder temperatures and will move down in the soil faster than bluebunch wheatgrass (Harrison, *et al*., 1994; Kindschy, 1994).

Researchers differ in their opinion regarding the invasiveness and spread of crested wheatgrass. Many of the taxa in the crested wheatgrass complex originated in Eurasia, as did cheatgrass and Russian thistle, giving crested wheatgrass the capability to compete well with these other introduced taxa. Studies in the Northern Great Plains have shown that it rarely spreads to adjacent native grasslands. Other studies in southern Idaho show crested wheatgrass reinvades native ranges (Harrison, *et al*., 1994).

Studies in southern Idaho show that crested wheatgrass has become denser, and plants have spread to adjacent areas. Other studies also show that crested wheatgrass reseeds itself well on western rangelands. Once established, crested wheatgrass seedings become difficult sites for other plant species to colonize (Harrison, 1996). It establishes closed communities, especially where interspaces between plants are fully occupied by their root mass. Plants disperse mature seeds slowly and carry over some seeds for more than one year. It can spread to rocky areas, waste places, and sagebrush range where it was not originally seeded. Species such as crested wheatgrass, which germinate early in the season and make rapid growth following emergence, can resist cheatgrass competition more successfully than slower developing species.

Pastures planted to crested wheatgrass can reduce livestock pressure on native ranges, because they can be grazed earlier in the season and heavier to maintain plant vigor and regrowth. Crested wheatgrass appears to have a greater tolerance to defoliation than native plants. The greater tolerance is related to the rapid growth of new tillers. Although some re-establishment of native species occurs in crested wheatgrass stands, many seedings have remained productive 20 to 45 years. Stress from repeated grazing or drought reduces vigor and competitiveness, allowing hardy species, especially sagebrush, to become established in interspaces (Harrison, *et al*., 1996; Kindschy, 1994).

Species of big sagebrush (*Artemisia tridentata subspp*.) and rabbitbrush (*Chrysothamnus spp*.) have been the only observed native species to effectively colonize seedings of crested wheatgrass. In Oregon, sagebrush has repopulated seedings in plowed and seeded areas, reaching about a 15 percent canopy cover during a twenty-year period (Harrison, *et al*., 1994). In sprayed and seeded areas, sagebrush reaches its pretreatment levels in approximately ten years. The severity of sagebrush re-establishment is related to the vigor of the crested wheatgrass stands, particularly on sites influenced by the intensity of livestock grazing. Various studies throughout the Columbia River Basin have reported, "reinvasion of sagebrush following its control is to be expected" and "that after seventeen years, even when managed for minimal ecological impact, sagebrush will return to crested wheat grass seedings following chemical brush control" (Harrison, *et al., 1994*). In northeast Nevada, studies show sagebrush, reestablishes following control and grass seeding treatments immediately after the brush is removed. Other research points to sagebrush encroachment being curtailed by competition from crested wheatgrass (Kindschy, 1994).

Crested wheatgrass seedings evaluated by Evans, *et al*. (1986) became "infested with sagebrush and rabbitbrush within five to ten years following establishment." Brush infestation, which may be as heavy as 20 to 25 percent crown cover, drastically reduces forage productivity of associated grasses. Data are limited and inconclusive. One estimate suggests that with each 1 percent increase in sagebrush crown cover forage production decreases by 4.5 percent when crown cover varies from 0 to 22 percent (Rittenhouse and Sneva, 1976; Kindschy, 1994; Harrison, 1994). Near Eureka, Utah studies show about 71 percent of sagebrush re-established within two years of initial brush removal in crested wheatgrass, intermediate wheatgrass and tall wheatgrass.

Native Sites

Approximately 12,000 acres (25 percent) of the Grassland have not been farmed, plowed or chained in the past. These unplowed areas are considered to have more natural occurring plant communities, although some introduced species of grasses may have invaded these sites.

About 15,000 acres on the Grassland, including the 12,000 acres that have not been previously farmed or treated, have been identified as "non-tillable acres" because of special soil or site features (See alternative maps in Chapter 2 for "non-tillable acres" location on the Grassland). These sites require special consideration prior to any management activity. (See Process Paper C in the Project File).

1. Soil islands or stringers that developed at or near the high water mark of ancient Lake Bonneville, generally between 5,100 and 5,500 feet in elevation. Fine-textured, chalky soils on these areas prevent dense growth of sagebrush and understory species.

2. Some dune areas in the south unit, also associated with the ancient lake, should never have their cover entirely removed, because of the potential for erosion.

Treatments that thin the overstory may be used to achieve resource objectives, but ground cover values need to be maintained at or above 60 percent.

3. Areas where threetip sagebrush (*Artemisia tripartita*), or green rabbitbrush (*Chrysothamnus viscidiflorus var. viscidiflorus*) or threadleaf rubber rabbitbrush (*C. viscidiflorus var. consimilis*) with canopy cover values greater than 5 percent need to carefully be evaluated by treatment method, because of their ability to resprout after disturbance.

4. Some settings appear to be more prone to invasion by annuals, especially cheatgrass, once disturbed. These areas need to be carefully identified prior to project work that may remove perennial cover.

Tree Rows

Tree rows were introduced to the Grassland in the 1970's to provide upland game bird habitat and were comprised of mostly Russian olive and Siberian pea shrub, introduced species. Approximately twenty-one miles of tree rows have been established on the Grassland (Curlew National Grassland Progress Report, 1972).

Properly Functioning Condition Assessment Results on Grassland Vegetation

In October 1998 a Forest Service Interdisciplinary Team met to assess vegetation cover types on the Grassland and adjacent areas in the Greater Curlew Valley (USDA-FS, 1998). A Vegetation Properly Functioning Condition assessment process, developed by the UDSA Forest Service Intermountain Region, was used (USDA-FS, 1996, Draft). The assessment process evaluates the biological and physical components of ecosystems. It is used as a coarse filter to compare current vegetation community conditions to historic conditions. It is important to remember that Properly Functioning Condition in this vegetation context is limited to biological and physical conditions and does not reflect potential management strategies or consider social or economic expectations.

Properly Functioning Condition (PFC) is defined as: "Ecosystems at any temporal or spatial scale are in properly functioning condition when they are dynamic and resilient to perturbations to structure, composition, and processes of their biological and physical components."

Risk refers to: "Situations in which the outcome is not certain, but the chance of system degradation beyond the point of resiliency and sustainability can be estimated."

Vegetation Properly Functioning Condition assessments differ from Riparian Properly Functioning Condition assessments. Riparian Properly Functioning Condition assessments are generally completed at a more refined scale and follow protocols outlined in the Bureau of Land Management's Riparian Properly Functioning Condition Technical Reference (USDI, BLM, 1993). The assessment for Vegetation Properly Functioning Condition is conducted at a subregional scale and follows the process outlined in the Forest Service, Intermountain Region's PFC process paper (USDA-FS, 1996, Draft).

The assumption in the Forest Service Subregional Properly Functioning Condition Assessment is that naturally evolving ecosystems (minimally influenced by humans) were diverse and resilient, and that within the framework of competition, evolutionary pressure, and changing climates, these ecosystems were sustainable in a broad sense. The Grassland Properly Functioning Condition assessment was assessed at two different scales: the subregional scale that included the 524,000-acre Greater Curlew Valley area, and the landscape scale which included the 47,600-acre Grassland. The PFC assessment area is bounded on the north by the Oneida/Power County line and the southern half of Arbon Valley; to the south by the Idaho/Utah state line; to the west by the Sublette Mountain Range; and to the east by the Pleasantview and Samaria mountain ranges.

The Greater Curlew Valley scale was used to provide a context of past and present land management practices and uses and how these activities relate to the Grassland and its management. The Greater Curlew Valley area was delineated based, in part, on issues related to habitats and movement of wildlife with large seasonal home ranges and the availability of existing vegetation cover data. Conclusions made by the team were based on assumptions of similar vegetation conditions as those on the Grassland and with limited knowledge of site-specific conditions.

The term "historic range of variation" refers to ecosystem composition, structure, processes and patterns for a specified period of time and for a specific area. These criteria were used in the Grassland assessment of Properly Functioning Condition. The temporal scale used, or point in time, to establish PFC indicators was approximately forty-five years ago when the Forest Service began administration of the Grassland in 1954. This time frame was selected, because many management activities, such as grazing, ranching/farming, and revegetation with non-native species, were already in place. These previous activities had significantly modified the landscape and vegetation of the Grassland prior to Forest Service administration.

Properly Functioning Condition of Sagebrush

Greater Curlew Valley Area

Within the Greater Curlew Valley conversion of sagebrush to agricultural production on private land has reduced the extent of areas historically dominated by big sagebrush species, such as basin big sagebrush, mountain big sagebrush, and sagebrush X, an unidentified cross of at least two sagebrush species. Of the total 348,000 potential sagebrush acres in the Greater Curlew Valley Area, approximately 52 percent are on private land, 31 percent are on BLM administered lands, and 13 percent are on the Grassland (Gardner, 1997). Today, about 177,000 acres, or about 51 percent, of the 348,000 potential sagebrush acres remain in sagebrush cover types. The remaining 171,000 acres are in private ownership and are generally under agricultural production. No estimates are available on how many of the 171,000 acres in private ownership are in the Conservation Reserve Program (CRP) and how many acres may be converting back to natural sagebrush cover. In Oneida and Power counties, approximately 180,000 acres of perennial cover are enrolled in the CRP program. Field sizes range from less than forty acres to over 500 acres (Sirotnak, *et al*., 1991)

On the remaining 177,000 acres of sagebrush acres in public land ownership, 62 percent provide sagebrush with canopy cover less than 10 percent (Gardner, 1997). Portions of public land have been treated by burning, plowing, chaining or herbicide application and then seeded with introduced grass species, such as crested wheatgrass and bulbous bluegrass (Handy, 1950; District 2210 or 2240 files). These practices have resulted in a reduction of diversity in understory plant species (See Appendix I). Sagebrush canopy cover has been fragmented as a result of wildfires and land management practices over time. Recent downward trends in populations of sagebrush habitat dependent species, such as the sage grouse, are attributed, in part, to shrub structure, abundance and composition of the understory composition and habitat quality (Gardner, 1997).

Using PFC indicators, a balanced range of big sagebrush structure and canopy cover classes with a twenty- to forty-year fire regime[19] cycle is considered necessary to provide for resilent and sustainable sagebrush ecological conditions (USDA-FS, 1996, Draft). Existing sagebrush structure and canopy cover classes and disturbance regimes within the Greater Curlew Valley indicate a high departure from this range of conditions .

Overall departure from historic conditions is high for sagebrush because of several factors, including conversion to agricultural lands, vegetation treatment practices, introduction of non-native plant species, livestock grazing, Conservation Reserve Program (CRP) and fire suppression. (Also, see West, 1999 for non-reversible influences.)

Curlew National Grassland

According to the current land status information on the Caribou National Forest, the Grassland occupies only 47,600 acres, or about 9 percent, of the 524,000 acres of the Greater Curlew Valley Area. Private land occupies about 36 percent of the area within the proclaimed boundaries (75,000 acres) of the Grassland. About 5,500 acres in private ownership are enrolled in the Conservation Reserve Program (CRP) and have the potential to reestablish sagebrush. Most of the private land is located on flatter, arable lands where big sagebrush was abundant.

Basin big sagebrush and sagebrush X are the most common sagebrush varieties found on the Grassland (Collins, *et al*, 1982) occupying approximately 95 percent of the area. Basin big sagebrush is the most common sagebrush and occupies about 75 percent of sage-dominated sites. Sagebrush "X"[20] occupies much of the remaining area, predominantly on the northern and eastern portions. Black sage, mountain sagebrush, and three-tip sagebrush communities are minor intermixed components. Wyoming sagebrush is not present on the Grassland but is found in the Greater Curlew Valley outside of the Grassland boundaries (Collins and Harper, 1982).

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[19] **Fire regimes** refer to the characteristics of fire in a given ecosystem, such as frequency of fire, predictability, intensity of burn, and seasonality. In rangeland vegetation types, lethal fires are fires where most of the shrub overstory or encroaching trees are killed; non-lethal fires are fires where more than 90% of the vegetative cover survives (implies that fire is occurring in an herbaceous-dominated community).

[20] **Sagebrush X**. Speculatively, sagebrush "X" appears to be a cross between *Artemisia tridentata vaseyana* and *Artemeisia tridentata wyomingensis* [pers. comm. Dr. Alma Winward on 4-24-00].

Three-tip sagebrush is not found in pure communities, but rather in mixed communities with other sagebrush types, except black sagebrush. A more comprehensive list of plants found on the Grassland can be found in the 1982 Collins and Harper study reflected in Appendix H. (See Sagebrush Canopy Cover Map on page 3-51).

The herbaceous (forbs and grasses) understories on sagebrush sites have declined in biomass with increasing sagebrush density. Agricultural practices have changed soil structure and understory composition as a result of mixing the soil through agricultural plowing. About 35,500 acres, or 75 percent of the Grassland, was cultivated and most of these acres have been seeded with introduced grasses at least once (Handy, 1950). Only 12,000 acres, or about 25 percent, have never been plowed and continue to support native vegetation on fragmented islands of uneven topography and steeper slopes. However, native sites that have not been plowed have been altered by livestock grazing and wildfire suppression.

Past sagebrush treatments have included prescribed fire, brush beating/cutting, herbicide applications, plowing, and chaining. Sagebrush stands have reestablished on treated sites at variable rates depending on climate, soil conditions, and treatment method. In general terms, sagebrush reestablishes in the shortest period, generally between ten and twenty years, after being treated by chaining, brush beating/cutting, or herbicide application (K. Timothy, pers. comm., 2000). It reestablishes at a slower rate and over longer periods, generally more than ten or twenty years, after being treated with either prescribed fire or plowing or a combination of both (USDA-FS, 1996; ID Team Field Trip Notes, 2001; District files and photographs).

Existing sagebrush structure, canopy cover classes, understory composition, and disturbance regimes indicate a high departure from PFC conditions (USDA Forest Service, 1996).

Mountain Brush

Greater Curlew Valley Area

Mountain brush occupies a small portion of the Greater Curlew Valley, only 35,600 acres, or about 7 percent (Gardner, 1997). Fire suppression has changed the disturbance regime to fewer, larger fires that are outside the natural twenty- to forty-year fire return interval.

Departure from succession is considered moderate because older age classes and increased shrub densities indicate a higher probability for more severe fire events that could affect neighboring sagebrush sites (USDA Forest Service, 1998).

Curlew National Grassland Assessment

Approximately 1,360 acres, or about 3 percent, have been identified as mountain shrub (Collins, *et al.*, 1982). Patterns in mountain brush appear to be within historical ranges for the number of historical acres and historical distribution. Fire suppression has changed the disturbance regime to fewer, larger fires that are outside the natural twenty- to forty-year fire return interval.

Departure from succession is considered moderate because of the older age classes found on the Grassland (USDA Forest Service,1998).

Canopy Cover Map here

Wildlife Habitat Management

Grassland habitats support a wide array of wildlife species including 21 game bird species, 125 non-game bird species, 56 mammals and 20 amphibian/reptile species (See Appendix C). Many of these species use the Grassland on a seasonal basis, however several species, such as the coyote, badger, mule deer, amphibians, sage and Columbian sharp-tailed grouse, are year-round residents. Rocky Mountain elk have been observed on the Grassland over the past several years (K. Timothy, pers. comm.). The Grassland is probably most noted for the early spring mating displays of sage and Columbian sharp-tailed grouse. This annual event attracts bird watchers locally and from out-of-state. The Grassland is a destination for resident and non-resident hunters pursuing morning dove, sage grouse, sharp-tailed grouse, pheasant, Hungarian partridge, chukar and waterfowl.

The Curlew Valley has been identified as an "Important Bird Area" in Idaho (Svingen, 1997; Ritter, 2000). The area met the criteria for listing based on the fact that it supports "species of special concern," sage grouse and Columbian sharp-tailed grouse. The valley, with its mix of sagebrush/grass, CRP, and agricultural lands, provides optimal habitat for these species. Introduced grasses that out-compete native species have been identified as the main threat to these habitats.

Predominant upland habitats occurring on the Grassland are: grass/forbs, sagebrush, riparian and mountain brush vegetation cover types (Gardner, *et al.*, 1997, USDA-FS, 1985, pg II-4). Human-made habitats, developed specifically to benefit wildlife species, include the Sweeten Pond complex (222 acres), waterfowl nest boxes, and approximately twenty-one miles of tree row plantings that provide food and shelter for upland game and other bird species.

The Sweeten Pond area is fenced to exclude livestock grazing. A wide variety of waterfowl, including Canada geese, ruddy, pintail, mallard and teal ducks, may be found loafing, feeding and nesting on or adjacent to the ponds. Co-op Springs and other wetland areas provide habitat for amphibian species, though no formal surveys or inventories have been completed in the area.

Threatened, Endangered, Candidate and Sensitive Species

Five federally listed threatened or endangered species are identified by the U.S. Fish and Wildlife Service as known or suspected to occur on the Caribou National Forest. The U.S. Fish and Wildlife Service submitted an updated species list for the Grassland on November 8, 2001. They identified four species to be considered: lynx, gray wolf, Ute ladies'-tresses, and yellow-billed cuckoo. All of these species are discussed below and are more fully detailed in the Biological Assessment. These species are: whooping crane (*Grus americana*)(experimental/non-essential population), bald eagle (*Haliaeetus leucocephalus*) (threatened), gray wolf (*Canis lupus*) (experimental/non-essential population), a threatened orchid, Ute ladies'-tresses (*Spiranthes diluvialis*) and the Canada lynx (*Lynx canadensis*) (threatened). In addition, in July 2001 the US Fish & Wildlife Service determined that a petition to list the yellow-billed cuckoo was warranted, but precluded its listing due to higher priorities for listing other species. This species has been added as a candidate species for the Caribou National Forest. There are no records of the above listed species occurring on the Grassland.

Bald eagles have been previously reported as occasionally present in the Stone Reservoir area in the winter; however, there are no records on file in the Forest Service Supervisor's Office, the Bureau of Land Management, the CDC or the Idaho Department of Fish and Game. The area could provide foraging habitat for part of the winter, but the largest share of the reservoir freezes over in the winter limiting foraging opportunities.

During the 1999 field season, a survey of potential habitat for Ute ladies'-tresses was completed for the Curlew Grasslands with no populations of Ute ladies'-tresses or other look-alike orchids being found. As indicated by the presence of redtop (*Agrostis stolonifera*), a few reaches of riparian habitat were identified as being "marginally suitable" for the species. All other riparian areas were determined to be unsuitable habitat. In the summer of 2001, one of the areas identified as "marginally suitable" was field-reviewed and determined to be not suitable; however, due to unfavorable drought conditions, further surveys were not done in 2001. (See Biological Assessment in Appendix J.)

The yellow-billed cuckoo has been documented on the South Fork of the Snake River (Saab, 1998). The cuckoo uses relatively larges blocks of riparian habitat, generally greater than twenty hectares or fifty acres, and especially mature cottonwood overstory with a dense willow understory (US Fish & Wildlife Service, September 2001). The Grassland has only one area of mature cottonwood with a shrubby understory located on Deep Creek at the inlet to Stone Reservoir. The area is approximately twelve acres in size and is more than one hundred miles from the South Fork of the Snake River. The cuckoo has been observed in southwestern Idaho, but the Grassland area is very small and separated from other areas of potentially suitable habitat. This species will not be analyzed in Chapter 4.

The entire Caribou National Forest was originally considered potential lynx habitat when the lynx was listed. Sagebrush areas were considered to provide for habitat connectivity (Ruediger, *et al.*, 2000); however, as a result of a meeting on September 5, 2001 with the U.S. Fish and Wildlife Service, Salmon-Challis, Bridger-Teton, Caribou-Targhee National Forests, and the Bureau of Land Management from Idaho and Montana, the Caribou portion of the Caribou-Targhee National Forest was dropped as suitable lynx habitat. Montpelier and Soda Springs Ranger Districts of the Caribou-Targhee National Forest have been identified as potential linkage habitat, while the Westside Ranger District, including the Grassland, is not considered linkage habitat. Lynx will not be considered further in this analysis.

The Grassland lies in the Central Idaho Recovery Area for gray wolves. The Grassland is about ninety-five miles from the nearest confirmed wolf pack in the recovery area. Sightings of individual wolves have been reported on the Soda Springs and Montpelier Ranger Districts. All of these sightings are over fifty air miles to the east of the Grassland. Further analysis for this species can be found in the Biological Assessment in Appendix J.

Sensitive Species

Sensitive species are defined as those plant and animal species for which population viability is a concern, as evidenced by a significant current or predicted downward trend in population numbers or density, or a significant current or predicted downward trend in habitat capability that would reduce a species existing distribution. The Regional Forester has designated fifteen

vertebrate and four plant species as "sensitive species" for the Caribou National Forest. Each of these species has the potential of occurring on the Caribou National Forest. (See Appendix C for listing.)

Of the Forest's nineteen sensitive species, only one is known to occur on the Grassland - the Columbian sharp-tailed grouse. Two other species have been previously identified as potentially occurring on the Grassland: the northern goshawk and western big-eared bat. (See Biological Evaluation in Appendix J.)

The northern goshawk may have been previously recorded as occurring on the Grassland, however, no suitable habitat for this species is found on the Grassland. Nests have been documented in the Pleasantview Hills to the east, and goshawks have also been documented on the Sublette Division of the Sawtooth National Forest to the northwest (J. Kumm, BLM Biologist, pers. comm.).

The western big-eared bat may have a range that extends onto the Grassland (Groves, *et al.*, 1997). The western big-eared bat may occur on or adjacent to the Grassland based on the availability of riparian and wetland areas for foraging habitat, but no surveys have been completed. No suitable habitat exists, such as caves or abandoned mines, on the Grassland for maternity colonies or winter hibernacula (caves or abandoned mines).

Columbian Sharp-tailed Grouse

Over the last decade concern has increased regarding Columbian sharp-tailed grouse populations in Idaho, the western United States and southern Canada. Once considered one of the most abundant upland game birds throughout much of the Intermountain West, its abundance and distribution have declined dramatically since the turn of the century. The loss and/or degradation of native grassland and shrub-steppe habitats from agricultural expansion, fire, invasion of non-native annual vegetation and overgrazing by livestock are cited as contributing to this species decline (Ulliman, *et al.*, 1998).

Columbian sharp-tailed grouse have undergone a significant range-wide decline; the species currently occupies less than 10 percent of its former range. Many remaining populations are small and widely separated from other populations. Idaho has the best remaining populations, with 75 percent of the remaining birds (Paige and Ritter, 1999).

In southeastern Idaho, the largest concentrations of sharp-tailed grouse are in Fremont, Bonneville and Oneida counties (Ulliman, 1995). Populations in Idaho are currently increasing due, in part, to the Conservation Reserve Program (CRP) (Sirotnak, *et al*, 1991, Meints, *et al*, 1992). Idaho spring breeding populations are estimated to be 20,000 to 50,000 birds (Ulliman, 1998).

Sharp-tailed grouse are nest habitat generalists and can adapt to many different habitats (Apa, 1998). Summer and brood-rearing habitat generally consists of shrub-steppe vegetation with 20-40 percent shrub cover interspersed with a high diversity of forbs and bunchgrasses, generally comprised of 60-80 percent grass/forbs cover. Summer habitat use generally consists of grasslands or habitat edges during the morning hours, moving to shrub cover during mid-day, then back to more open vegetation types towards the evenings (Ulliman, 1995).

During winter, sharp-tailed grouse exhibit a close association with deciduous trees and mountain shrubs in upland and riparian areas, because they provide the only adequate food source and shelter from weather and predators. Severity of the winter influences habitats used by sharp-tailed grouse. Unless forced by heavy snows, birds do not move out of summer/fall habitat (Ulliman, 1993). The most important shrub species in these cover types are serviceberry, chokecherry, bittercherry and Hawthorne (Ulliman, 1995). Most sharp-tailed grouse wintering area is found adjacent to the Grassland, although mountain brush, tree rows and riparian areas on the Grassland may be used during the winter. Saab and Marks (1992) describe preferred sharp-tailed grouse habitat as having moderate vegetative cover, high plant species diversity and high structural diversity.

Table 3.9 displays the estimated current quantity of sharp-tailed grouse habitats in the Grassland and Greater Curlew Valley Area

Table 3.9. Estimated Acres of Sharp-Tailed Grouse Nesting/Summer/Brood-rearing and Winter Habitats at the Grassland and Greater Curlew Valley Area landscape scales
(Data from USFS geographic information system (GIS) files and Gardner, *et al.*, 1997)

Habitat	Curlew National Grassland	Greater Curlew Valley Area
Nest/summer/brood	26,639[1]	96,765
Winter	1,720[2]	60,754

[1]Assumes shrub-steppe vegetation interspersed with a high diversity of forbs and grasses.
[2]Mountain brush, riparian, and tree rows.

Sharp-tailed grouse favor lek (traditional breeding ground) locations having low, mottled, or sparse vegetation with good visibility. Leks tend to be used year after year and are focal points in population surveys and management of sharp-tailed grouse populations. In the fall a hunting season for sharp-tailed grouse occurs in southeast and eastern Idaho. The Grassland draws both resident and non-resident hunters; the daily bag limit is two birds with four birds in possession after the first day of the season (Idaho, 1998, pg 15).

Several Master's thesis and one Doctoral dissertation have addressed sharp-tailed grouse ecology on and adjacent to the Grassland (Apa, 1998; Ulliman, 1995a; Schneider, 1994). Because of recent increases in some sharp-tailed grouse populations, improved range condition, and the Conservation Reserve Program, interest in transplanting sharp-tailed grouse to historic ranges within Idaho and surrounding western states has increased (Meints, *et al.*, 1992). In 1988 the Idaho Department of Fish and Game began live trapping of sharp-tailed grouse to transplant in suitable habitats in other areas of the Idaho and out-of-state. The transplant program has been ongoing since 1988, with the exception of 1989-90, with birds trapped from the Grassland and adjacent ownerships (D. Rose, IDFG Biologist, pers. comm.). Birds from the local area (Arbon Valley, Rockland and Curlew) have been transplanted to Idaho, Oregon, Washington and Nevada, but transplants have not been very successful to this point (D. Meints, IDFG Biologist, pers. comm.).

On October 26, 1999 the U.S. Fish and Wildlife Service published a 90-day finding on a petition to list the Columbian sharp-tailed grouse as threatened (Federal Register, 1999). On October 11, 2000 the U.S. Fish and Wildlife Service determined that the Columbian sharp-tailed grouse was not warranted for listing under the Endangered Species Act (ESA). Their review showed that

some of the smaller, isolated populations are currently at risk of extinction, but there are numerous larger populations that are relatively secure and possibly increasing. In addition, various state and federal agencies are actively managing these populations to improve their overall status and are attempting to restore the grouse to unoccupied but suitable habitat. Table 3.10 displays Columbian sharp-tailed grouse lek survey results in and adjacent to the Grassland from 1980 through 1999.

Management Indicator Species (MIS)

Management indicator species are selected to measure effects on other species associated with specific habitats. Generally to be selected for MIS, species should meet several criteria: (1) the species should be an indicator of environmental conditions including native ecological processes, (2) they should be affected by management activities on National Forest system lands, (3) they should be a native or restricted range species, (4) they should be a keystone species or habitat specialist, (5) they should be found on most or all of the planning area, (6) they should be a yearlong resident of the planning unit vicinity, (7) they should be relatively easy to monitor, (8) it should be feasible to monitor populations and habitat conditions at similar scales and (9) baseline data is already in place (USDA-FS, 1997).

Mule deer and elk, which were identified as MIS in the Caribou National Forest's 1985 Forest Plan, will be dropped as MIS on the Grassland. They are not good ecological indicators; they are not yearlong residents; they are not habitat specialists, and they take advantage of a wide variety of habitats in spring and summer. They do not have restricted ranges and do not show clear responses to management activities. Because of these factors, these species will not be carried forward as MIS for the Grassland. Management Indicator Species were selected for two major habitats: shrub riparian breeding birds for riparian habitat and sage grouse for sagebrush habitat. More information on big game use on and adjacent to the Grassland can be found in the Wildlife Process Paper in the project file.

Riparian

The 1985 Forest Plan did not identify MIS for riparian habitats. Riparian systems on the Grassland have been impacted by past activities and most of the reaches do not support healthy riparian vegetation. No baseline surveys have been completed, and no one species stands out as a potential MIS. Neotropical migratory birds are often used but do not meet many of the criteria listed above. Breeding may be affected by climatic variations; they are not year-round residents; and monitoring has the potential for several sources of error.

However, in spite of this, breeding birds (many of which are neotropical migratory birds) will be used as indicators of biodiversity richness. Sanders and Edge (1998) found that riparian shrub vegetation structure is associated with avian abundance, species richness, riparian-associate bird species abundance and landscape-level biological biodiversity. Breeding birds will serve as focal species for determining and maintaining habitat integrity. Monitoring to assess the occurrence of these species, in addition to changes in riparian shrub structure will provide a better picture of ecosystem health.

Table 3.10. Columbian Sharp-tailed Grouse Lek Survey Results in and adjacent to the Curlew National Grassland, Oneida County, Idaho from 1970 through 2001 (from Idaho, 2001)[1]

Lek ID	Last Count	01	00	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70
001	1993									4	15		8																				
002	1992										14																						
003	1994								6	9	17																						
004	1994								0	2	12																						
005	?																																
006	1994								1	11	17																						
007	1995							0		6	15																						
008	1995							7		4	8		30																				
009	1995							6		4	27																						
010	1994								6	2	13																						
011	?																																
012	?																																
013	?																																
014	?																																
015	1995							20	5																								
016	1995							0		5																							
017	1995							5	8																								
018	1993									3																							
019	1995							8				27	36	57																			
020	?																																
021	1995							6		10																							
022	1995							22	4		15																						
023	2001	25	20	27	12	5	8	16		8	12	28																					
024	2001	30	30	38	18	16	13	12		7	12																						
025	2001	16	23	17	5	6	0	17		0	8																						
026	1991											8																					
027	2001	3	9	13	7	12	10	5	13																								
028	2001	16					0	19		3	15	14																					
029	2000		11	28	15	7	10	15	5	13	15	14																					
030	1991											18																					
031	1999			0			9	4	0	12	20																						
032	1997					10		17					3																				
033	1990												7																				
034	1995							4		12	15	15	12																				
035	1999			3			4	11																									
036	1995							3																									
037	1999			14				8	5																								
038	1999			23			23	15																									
039	1995							4	12																								
040	1995							14																									
041	1996						0	20	10																								
042	1995							7																									
043	1995							8	3			6	8																				
044	2001	11	20	26	30			8		6																							
045	?																																
046	1994								3																								

Lek ID	Last Count	01	00	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70
047	1992										5																						
048	1995							0	0	0	0	0		4	10		8		18	5	1	12	22		11	23	20						
049	1997					0											0		18	5	0	5	12		6	10	0	6	2				
050	1986																?						9			6	3						
051	2001	18	12	16	18	16		12	15																								
052	2001	11	21	30																													
053	1997					15			8																								
055	1995							0	2	5	10	7																					
056	1991											4	8																				
060	2001	15+										18																					
061	2000		3	7	16		10	16	0	5	9																						
062	2001	20	0	21	3	1	2	14	14	12																							
063	2001	0	0	24	9	25	18	0	11	0	4	15																					
064	2001	4	12	10	22	14	15	6	17	4	17	25	28	20	60		18																
065	1998				0		0	0		0	5	12	12	12	12		1		7	21	5	9	23										
066	?																																
067	?																																
068	2001	8	21	20			0	14		10																							
069	1988														15								7		11	16	29	16					
070	2001	5	18	15				0	0	0	0	0	16	6	10																		
071	1980																						6										
072	2000		4					4				7																					
073	2000		0	3				0	0	0	0	0	1				11						8										
074	1999			12								5	4		15				6	10	18	7	14			18	29	16					
075	1991											5																					
076	1995							3	0	8		15																					
077	?																																
078	?																																
079	2001	15	14	23									3				0						5			7	8						
080	1988														12																		
081	?																																
082	2001	16	35			9		10	0			10	6	9																			
083	1991											0		5																			
084	1997					8	8	7	0			13	13																				
085	1997					8	5	4				0	12	12																			
086	1991											0	1	6	10																		
087	1995							3				3	4																				
088	1991											8																					
089	1991											0	11	13																			
090	1991											3	5	6																			
091	1990												3																				
092	1990												20																				
093	1990												13																				
094	1994								8																								
095	1988														6																		
096	1991											27	36	57																			
097	1993									15																							
098	1993									10																							
099	1997					7		5																									
100	1995							3																									

Lek ID	Last Count	01	00	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70
101	1995							3																									
102	1995							5																									
103	1995							4																									
104	2001	16						10																									
105	1995							3																									
106	1995							3																									
107	2001	14																															
108	2001	13	10																														
109	2001	37	46																														
110	2001	5	19																														
111	2001	17																															
112	2001	18																															
113	2001	15																															
TOTAL		333	328	349	152	179	136	397	144	207	290	320	300	207	150	0	38	0	49	41	24	33	106	0	46	91	76	22	2				

[1] Where no data is recorded, monitoring did not occur on that lek in that year.

Sagebrush

Sage grouse are a good sagebrush management indicator species and meet the criteria previously identified. They are currently a MIS for the Caribou and will continue to be used as a MIS for the Grassland.

Several other species of birds depend on sagebrush or are sagebrush obligates. These include the sage thrasher, Brewers sparrow and sage sparrow (Paige and Ritter, 1999), all of which are expected to be present on the Grasslands (Groves, *et al*, 1977). Sauder (2000) completed bird surveys in seven sagebrush plots in the Greater Curlew Valley Area. He found twenty-three species in the sagebrush plots, but 65 percent of all birds counted were Brewers sparrows. Table 3.11 below displays breeding and foraging habitat used by these species.

Table 3.11. Sagebrush Obligates and Habitat Components (Paige and Ritter, 1999)

Species	Nesting habitat	Foraging habitat, prey
Sage thrasher	Dense sagebrush, nest in or beneath shrubs	Forages on ground between shrubs, favors Mormon crickets but also eats grasshoppers and other insects, fruits and berries
Brewers sparrow	Dense sagebrush with diverse understory, nest low in tall sagebrush plants	Forages on foliage of shrubs, foraging on weevils, aphids, other insects, and grass and forbs seeds
Sage sparrow	Tall sagebrush stands with little understory grass cover and areas of bare ground. Nest in sagebrush, occasionally on ground under shrubs	Forages on the ground and in shrubs, feeding on insects and seeds

These species have not been identified as Species-at-Risk for this Planning Unit in Idaho (Idaho Partners in Flight 2000). These species use habitats and habitat components similar to sage grouse - tall dense sagebrush with grass and forbs understories. Welch (1999) summarized information from many studies on these species and also concluded that their habitat requirements are similar to those of nesting sage grouse. While habitat conditions varied in these studies, canopy covers from 20-30 percent were commonly used by these species. Because sage grouse are currently being monitored and meet the criteria for MIS, this species will be used to predict effects on other sagebrush obligate species.

Sage Grouse

Available data indicate sage grouse (*Centrocercus urophasianus*) have declined throughout their range. Long-term data from nine western states show breeding populations have declined from 17 percent to 47 percent from the long-term average (Connelly and Braun, 1997). Based on their analysis, populations in Idaho have decrease by 40 percent.

Because of the decline in sage grouse numbers in Idaho, the Idaho Department of Fish and Game developed a sage grouse management plan (Idaho, 1997) and have implemented the plan through a Memorandum of Agreement signed by the Idaho Department of Fish and Game, Idaho Department of Lands, Pheasants Forever, Bureau of Land Management (Idaho), the Natural

Resource Conservation Service (Idaho) and the Forest Service (Intermountain Region). A local working group of individuals and representatives from local interest groups, state and federal agencies was established in April 1998 to develop and recommend strategies for returning sage grouse numbers to desired levels.

In 2001, a Memorandum of Understanding (MOU) was signed by the Western Association of Fish and Wildlife Agencies, Forest Service, Bureau of Land Management, and the U.S. Fish and Wildlife Service. Objectives in the MOU include maintaining and increasing the distribution and abundance of sage grouse, identifying causes for declines and developing a conservation framework. State or local conservation plans are to be developed. Idaho had not yet begun to look at the objectives of the new MOU and develop a conservation framework (T. Hemker, Upland Game Program Manager, IDFG, pers. comm.)

The Washington population of sage grouse was petitioned for listing in 1999. In 2001, the U.S. Fish and Wildlife Service found that listing was warranted, but precluded by higher priority listing actions (USFWS, 2001a).

One doctoral dissertation has addressed sage grouse ecology on and adjacent to the Grassland (A.Apa, 1998). Data from the Apa study indicate the sage grouse population on the Grassland is non-migratory,[21] and the available habitat is non-uniformly distributed (A. Apa, pers. comm.). New guidelines for management of sage grouse populations and habitats have been published and summarize current knowledge of sage grouse ecology (Connelly, *et al*., 2000).

Habitat Use

Sage grouse depend primarily upon sagebrush habitat for much of the year (Braun, *et al.*, 1977), although meadows and mesic sites are seasonally important habitat components (Klebenow 1969; Connelly, *et al.*, 1988; Fischer, *et al.*, 1996). Sage grouse prefer sagebrush habitat year-round, however other shrub species within sagebrush communities may be used (Braun, *et al.*, 1977; Connelly, *et al.*, 1991). During the winter months sage grouse rely almost exclusively on sagebrush with a relatively dense canopy for food and cover (Eng and Schladweiler 1972; Beck 1977; Wallestad, *et al.*, 1975). Sagebrush provides nesting habitat (Klebenow 1969; Connelly, *et al.*, 1991; Gregg, *et al.*, 1994) and brood-rearing habitat during the spring (Klebenow 1969; Martin 1970; Wallestad 1971; Gregg, *et al.*, 1994). Sage grouse have higher nesting success in sagebrush communities with a dense canopy and tall grasses that result in lower predation rates (Gregg, *et al.*, 1994; DeLong, *et al.*, 1995).

Sage grouse are solely dependent upon sagebrush from fall to spring (Hanf, *et al.*, 1994). During spring the diet shifts to forbs. In addition, forbs provide essential nutrients for pre-laying sage grouse hens, which may ultimately affect their reproductive success (Barnett and Crawford, 1994). Forbs and insects are a fundamental part of the diet of sage grouse chicks (Martin 1970; Wallestad 1971; Drut, *et al.*, 1994; Sveum, *et al.*, 1998). During the early part of a chick's life, insects (beetles and ants) predominate the diet. After this time, forbs become the most important

[21] **Non-migratory** means average movement of sage grouse is less than or equal to ten kilometers (Connelly, *et al.*, 2000).

food (Klebenow and Gray, 1967). Sage grouse consume fewer forbs and more shrubs as forbs begin to dry out.

Similar to sharp-tailed grouse, sage grouse display a promiscuous mating system with males congregating on traditional leks[22] each spring. Leks may remain active for a few years (one to ten years) and then become inactive (K. Timothy, pers. comm.). "Adequate" sage grouse nesting and brood rearing habitat is characterized as having a 15-25 percent sagebrush canopy coverage and approximately seven inches or more of grass and forbs understory during the May nesting period (Connelly, *et al*., 2000). Apa (1998) found in his study the majority of sage grouse nests were under Basin big sagebrush and mountain big sagebrush.

Late summer brood habitat consists of a variety of habitats including sagebrush, meadows and riparian areas. These habitats need to include a variety of succulent vegetation and be adjacent to sagebrush escape and loafing cover. Winter habitat must have sagebrush present, the only winter food of sage grouse. The sagebrush community must be exposed above the snow with canopy coverage of 10-30 percent (Connelly, *et al.*, 2000). Records indicate that sage grouse have wintered throughout the Grassland (Caribou National Forest 1979). Table 3.12 displays the estimated quantity of sage grouse habitats in the Grassland and Greater Curlew Valley Area.

Table 3.12. Estimated Acres of Sage Grouse Nesting/summer/brood rearing and Winter Habitats at the Grassland and Greater Curlew Valley Area landscape scales

(Data from USFS geographic information system (GIS) files and Gardner, *et al.,* 1997)

Habitat	Curlew National Grassland	Greater Curlew Valley Area
Nest/summer/brood[1]	18,738 (from GIS)	85,000
Winter[2]	27,082 (from GIS)	104,200

1 Characterized as having 15-25 percent sagebrush canopy coverage and a grass and forbs understory during the May nesting period. Late summer brood habitat consists of a variety of habitats including sagebrush, meadows and riparian areas with a variety of succulent vegetation.

2 Sagebrush community exposed above the snow with a canopy coverage of >15 percent.

Factors Potentially Affecting Populations

Activities on the Grassland, such as sagebrush removal, herbicide application, hunting, wildfire, livestock grazing, fences, powerlines, and predation along with adverse weather, are factors identified by Connelly and Braun (1997) and Braun (1998) that may have contributed to the decline of sage grouse rangewide. The Grassland in relation to these factors are summarized below. For more information on these factors, see Appendix I.

[22] **Lek** (active) a traditional display area in or adjacent to sagebrush-dominated habitats that has been attended by greater than or equal to two males in greater than or equal to two of the previous five years (Connelly, *et al*., 2001).

Habitat

Much of the land within the Grassland was farmed in the early 1900's. Since that time sagebrush canopy cover has generally increased on the Grassland (See Appendix I).

Table 3.13. Sagebrush Canopy Cover (cc) Distribution on the Grassland Over Time (See Appendix I for calculations)

Time Period	Agriculture	Acres (%) in 0-5% cc	Acres (%) in 6-15% cc	Acres (%) in 16-24% cc	Acres (%) in > 25% cc
Presettlement	0	7,140 (15%)	23,800 (50%)	11,900 (25%)	4,760 (10%)
1910-1920	33,766 (75%)	1,800 (4%)	6,000 (13%)	3,000 (7%)	1,200 (3%)
Early 1970's	0	23,911 (61%)	5,157 (13%)	5,157 (13%)	5,157 (13%)
1999	0	7,675 (17%)	10,836 (24%)	18,963 (42%)	7,676 (17%)

This suggests that there has been a trend toward more closed sagebrush canopy stands over presettlement conditions and historical conditions on the Grassland. This supports the Grassland Vegetation PFC assessment, which found that sagebrush habitats currently are skewed toward denser sagebrush canopy classes.

In the 1930's and 1940's the Soil Conservation Service planted an exotic perennial, bulbous bluegrass, to stabilize soil and watershed conditions. Bulbous bluegrass is the dominant herbaceous component on approximately 5,200 acres (K. Timothy, pers. comm.) of the Grassland. This species tends to grow early in the spring and then dries up and withers quickly providing little cover for nesting birds. Bulbils add palatability of dry forage; starch and fat make them attractive to rodents and birds (Locke and Burrill, 1994).

More recently, much of the Grassland has been seeded to crested wheatgrass. Crested wheatgrass successfully outcompetes native species, and these areas generally have very low understory diversity. As a result, a decline in native herbaceous understory diversity has occurred. Diversity in the herbaceous understory of sagebrush communities has been identified as essential for nesting and brood-rearing sage grouse.

Livestock Grazing/Residual Vegetation

Residual vegetation is considered a key habitat component for early spring, ground-nesting species such as sage and sharp-tailed grouse; nest sites with denser residual vegetation are more likely to be successful (Ulliman, *et al.*, 1998, pg 10; Apa, 1998 pgs. 3, 5-6; Connelly, *et al.*, 2000). The Idaho Sage Grouse Management Plan (Idaho, 1997, page 12; Connelly, *et al.*, 2000) recommends that nesting and early brood-rearing habitat be managed to provide 15-25 percent sagebrush canopy coverage and about seven inches or more of grass and forbs understory during the May nesting period.

In May 1999, transects were laid out in several grazed fields to determine grass height and sagebrush canopy cover. Table 3.14 displays raw data that shows most of the measured fields were not meeting the minimum residual heights for good nesting cover, although sagebrush canopy cover requirements were being met (See Project File).

Table 3.14. Spring 1999 Residual Grass and Forbs Height Values Measured in Selected Fields Curlew National Grassland, Oneida County, Idaho

Grassland Field	% Sagebrush Canopy Cover	Number of Transects/ Measurements	Mean Grass Height in Inches	% of Grass greater than 7 inches
East Hess A[1]	46%	2/40	4.5 inches	23%
East Hess B[1]	36%	2/40	4.0 inches	15%
South Hess Haws [1 2]	28%	3/60	5.9 inches	32%
Exchange	4%	2/40	6.9 inches	50%
East Hunsaker[1]	26%	4/80	6.9 inches	41%
North Funk	21%	4/78	5.3 inches	27%
East Jacobsen	18%	5/100	5.8 inches	30%
South 13[1]	16%	5/100	3.9 inches	11%
North 13	19%	10/198	5.9 inches	38%
East Huffman	18%	7/139	5.4 inches	30%
BLM Adm (Meadowbrook)	24%	3/60	7.4 inches	55%

1 Fields dominated with bulbous bluegrass
2 Not grazed during 1998

The timing and intensity of livestock grazing the previous season and the dominance of bulbous bluegrass in some fields were contributing reasons why the recommended vegetation heights were not attained.

Table 3.15 displays the results of fall measurements (November, 1999). These measurements reflect spring/summer growth and fall regrowth. Most of the pastures sampled in the fall had residual grass/forbs heights in excess of those recommended in the 1997 Sage Grouse Management Plan and Connelly, *et al*., 2000. Further correlations between the timing and intensity of livestock grazing and residual herbaceous vegetation for upland bird nesting habitat is warranted.

Table 3.15. Fall 1999 Residual Grass and Forbs Height Values Measured in Selected Fields Curlew National Grassland, Oneida County, Idaho

Field Name	Number of Transects/Measurements	Mean Height (Inches)
South 13	5/100	6.2
North 13 [1]	10/200	10.8
East Hunsaker	6/120	7.6
BLM Exchange	2/40	9.3
North Funk	4/80	10.6
East Hess A	2/40	8.2
East Jacobson	5/98	6.2
East Huffman	7/140	4.6
East Hess B	2/40	11.1
South Hess Haws	3/60	16.1

Livestock grazing has traditionally been measured through percent utilization of the plants. No acceptable correlation exists between utilization and residual vegetation height. In September 2001, several transects were completed to compare percent utilization with residual vegetation height (See Project File, Field Notes Report, 2001).

Table 3.16. Percent Utilization and Residual Vegetation Height Measured in Selected Fields on the Grassland Fall, 2001

Field Name	Percent Utilization	Residual Vegetation Height
South Hess Haws	40%	5 inches
East Hess B	6-20% (slight)	5 inches
Fredericksons Exchange	60%	6 inches
North 13 (NE)	0 (not grazed)	9.6 inches
North 13 (SW)	0 (not grazed)	6 inches
West Vanderhoff	0 (not grazed)	12-16 inches
Sweeten Pond	0 (not grazed)	14 inches
West Carter	40%	4-5 inches
Neilson Exchange	40%	5 inches
SW Peterson-Lonigan	0 (not grazed)	6 inches

This table shows that there is great variation in residual vegetation heights following grazing. In some cases, even lightly grazed fields and ungrazed fields do not have an average of seven inches of residual vegetation height. Both species of grass and weather influence the height of vegetation. Precipitation data from Malad (1971-2000) shows that in this thirty-year period, the average precipitation from May through August was 5.1 inches. In that thirty-year period, ten years showed above average precipitation, five years showed average precipitation, and fifteen years, or more than half of the thirty-year period, showed below average precipitation.

Wildfire

Wildfires on the Grassland are aggressively suppressed. Wildfires on adjacent Bureau of Land Management lands have contributed to a loss of suitable habitat in the Greater Curlew Valley Area. (See Appendix I for more information).

Hunting

In the fall, a sport hunting season for sage grouse is held in southeast and eastern Idaho. The Grassland draws both resident and non-resident hunters; the daily bag limit is one bird with two birds in possession after the first day of the season (Idaho, 1998, pg 14). Prior to 1996 the daily bag limit for sage grouse was three birds with six birds in possession after the first day of the season.

The Shoshone-Bannock Tribe has treaty rights that include hunting on the Grassland. The level of tribal harvest of sage grouse is not known but is expected to be minimal (D. Meints, IDFG Biologist, pers. comm.).

Predation

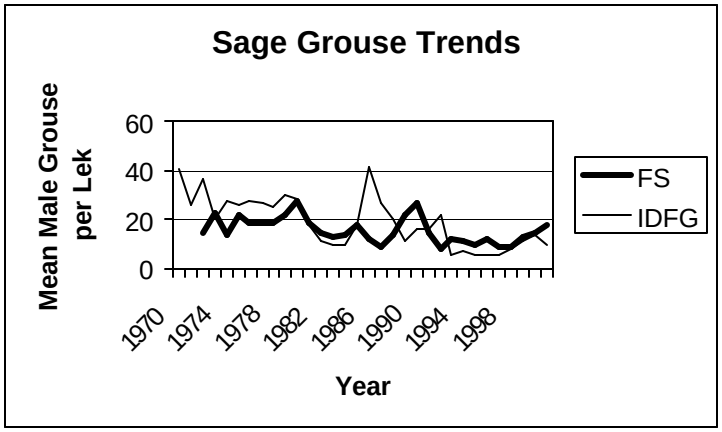
In the spring of 1999, Idaho Fish and Game conducted a predator study, using artificial nests. The nests were checked at three- and seven-day intervals. At three days, approximately 64 percent of the eggs had been taken. After seven days, the rate of take increased to 84 percent. Based on evidence at the nest sites, avian predation was considered the primary cause (D. Meints, 1999). The study continued in the spring of 2000 by Idaho Fish and Game and USDA Wildlife Services (D. Meints, and C. Maycock, 2000). Predators were removed from one area while the other area was left as a control area. The nest study was conducted using the same protocols as the 1999 study. At day seven, twenty-eight percent of the eggs in nests in the treated area had been removed. In the control area, 98 percent of the eggs had been removed. Predation appeared to be about 75 percent avian caused and 25 percent mammal caused. This study did not provide any new information, but it confirmed that predators take advantage of available food sources.

Population Trends over the Greater Curlew Valley Area and the Curlew National Grassland

Sage grouse population trends on the Grassland have been a point of disagreement. The Grassland comprises only 9 percent of the Greater Curlew Valley Area, which has been identified as a breeding population. Since the Grassland comprises such a small percentage of the breeding population area and because the habitat is fragmented into three units with private land between and within each unit, population trends over the Greater Curlew Valley Area are important. Based on the available data from both Idaho Fish and Game and Forest Service lek counts, the population trend has been cyclic but generally declining over the last thirty years.

After a review of factors potentially affecting sage grouse on the Grassland (Appendix I), it appears that the number of young recruited into the population is low. However, the real numbers are not known and this conclusion is based on limited data. If this is really the case, it is still not known what factors are affecting recruitment of young: weather, lack of residual vegetation, increased predation, lack of understory diversity for foraging or other factors.

Figure 3.5. Sage Grouse Trends from 1970-1998
Idaho Department of Fish and Game and Forest Service



Previous analyses in 1999/2000 and 1985 have looked at sage grouse populations. Both of these analyses assessed how many sage grouse the area could support, rather than determining viable populations.

In 1999, approximately 253 male sage grouse were counted on leks within the Greater Curlew Valley Area, and 213 male adults were counted within the same area for 2000. These numbers indicate an average of 233 males per year. Given a ratio of 1.8 females per male (J. Connelly, pers. comm., June 24, 1998, and D. Meints, pers. comm., June 29, 1998), 419 breeding females are estimated to occur within the Greater Curlew Valley Area, resulting in an estimated total breeding population of 652 sage grouse. The number of current-year offspring going into the fall period is estimated to be between 214 and 284 based on the following assumptions:

- All breeding females are adults, of which 80 percent nest, with a resulting 50 percent nest survival rate of 1.7 chick/nest survival into the fall hunting season.

- Or all breeding females are yearlings of which 60 percent nest with a resulting 50 percent nest survival rate of 1.7chick/nest survival into the fall hunting season.

A total population of between 876 and 948 sage grouse are estimated to survive into the fall, prior to hunting season. These values do not consider the influence of sage grouse reproductive status of the males to determine effective breeding populations, emigration or immigration.

The 1985 Forest Plan identified a viable population of 200 sage grouse on the Grassland. The analysis that was used to determine this population number was based on population densities in the 1970's and the number of sage grouse the available habitat would support if the habitat was managed to maintain sagebrush over the long term. The number was actually an estimate of the number of sage grouse the Grassland could support at the end of the planning period, not a viable population. The assumptions made during this determination underestimated the amount of dense sagebrush cover that would be available.

Based on sage grouse lek attendance data, approximately 484 breeding adults occur within the Grassland. In 1999, approximately 134 male sage grouse were counted on leks within the Grassland. In 2000, approximately 154 male sage grouse were counted on the same leks for an average of 144 male sage grouse per year. Given the ratio of 1.8 females per male, approximately 260 breeding females are estimated to occur on the Grassland, resulting in an estimated total breeding population of 404 sage grouse. Using the same assumptions described above for the Curlew Valley area, it is estimated the number of current-year offspring going into the fall is between 133 and 177 chicks. A total population of between 537 and 581 sage grouse are estimated to survive into the fall prior to hunting season.

The previous analyses were done to identify the minimum number of sage grouse present in the Greater Curlew Valley Area and the Grassland. Sage grouse numbers used were based on the total number of males counted on leks. Not all leks are surveyed every year by either Idaho Department of Fish and Game or the Forest Service. Because some leks have not been surveyed, the total number of sage grouse is not available. Because the Grassland is fragmented and is

such a small portion of the Greater Curlew Valley Area (the breeding population area), population viability cannot be addressed at the Grassland level.

Sage grouse density was not calculated for this analysis. While done in some areas to provide and idea of the quality of habitat, its use on the Grassland is limited. First, sage grouse numbers only reflect those leks that were surveyed. Second, the habitats on the Grassland vary widely in suitability based on factors such as sagebrush canopy cover and understory diversity. Third, sage grouse move freely back and forth from adjacent private and BLM land.

Table 3.17 displays sage grouse lek survey results in and adjacent to the Grassland from 1966 to 2001. For more information on sage grouse population trends, see Appendix I.

Table 3.17. Sage Grouse Lek Survey Results in and adjacent to the Curlew National Grassland, Oneida County, Idaho from 1966 through 2000. (From Idaho, 2000)

Lek ID	Last Count	00	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66
001	1999		0			0			0		18	24	9																								
002	2000	0	0			0			0		0	3	3																								
003	1996					0			6		13																										
004	2000	15	0	0	0	0	6		6		15	14			41	49	6	13		0	0																
005	1996					0	0		0		6	5																									
006	1998			0	4																															
007	2000	3	2	1	9	4											15	0	0	7	7					35										
008	1985																0	1	8	18	32	42	34	49	44	30	34				43	40	37			
009	?																																			
010	?																																			
011	1987														44								34	29	44	31	36									
012	1978																							8	13	31	28	39	19	44		60				
013	1999		0	0	0	0	5	3			29	31	27	35																						
014	2000	0	0	0	0	0	0	0		1	1	5	8		25	34	34																			
015	2000	13	6	8	4	5	6	0		22	23	23	18																							
016	2000	0	0	0	0	0		0			6	7	7	11																						
017	2000	0	0	2	2	0					20																									
018	1996					0					7																									
019	?																																			
020	?																																			
021	?																																			
022	2000	8	10	12	6												0	11	4	12	8	4	15	20	26	14	13	19	22		28	42	22	29	21	21
023	2000	0	6																																	
024	2000	0	5	9	15	14					27	33			0		0	7	20	8		47			18				27	26	6					
025	2000	2	3																																	
026	?																																			
027	?																																			
028	2000	4	1	3	8	9																														
029	1999		1																																	
030	2000	12	0	0	3		2	10			18	24																								
031	2000	33	40	18	6						11																									
032	1993								5																											
033	?																																			
034	1999		1																																	
035	?																																			
036	1999		2																																	
037	1999		5																																	
038	?																																			
039	2000	22	19	0	0	0																		2	10	29	12	26	13	40						
040	1997				0	0					0	6			16																					
041	2000	0	2	4	5																															
042	1978																							0	0	20										
043	2000	1	8	14	5	5						11			11		0	1	1	7	11	29		30	18	24										
044	2000	0	0	2	0	2																														
045	2000	27	8	0	7																															
046	2000	2	25	12																																

Lek ID	Last Count	00	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66
047	1999		6	3																																
048	1999		23																																	
049	2000	0	2																																	
050	1999		1																																	
051	2000	0	14																																	
052	2000	7	15																																	
053	2000	0	5	3																																
054	1999		8																																	
055	1999		25																																	
056	2000	45	34																																	
057	2000	0	3																																	
058	2000	3	15																																	
059	2000	9	8																																	
060	2000	8	13	9																																
061	2000	0	14																																	
062	1998													15								7		11	16	29	16									
063	?																																			
064	1994						0					6																								
065	2000	7	7	1	3	6	12																													
066	1982																			3																
067	1978																						34	29	44	31	34									
068	1979																0	1	8	18	32	42	34	49	40	30	36									
069	1985																																			
070	?																																			
071	2000	21																																		
072	1994							0				6																								
073	1995						0																													
074	1995						0													0	0															
075	1971																														0	22				
076	?																																			
077	1982																			0																

1 Where no data is recorded, monitoring did not occur on that lek in that year. Over the past two years, monitoring has been more intensive.

Species at Risk (SAR)

Several species have been identified for which population viability may be a concern. They may be at risk based on population densities or trends, threats to habitats, or because they are locally rare. The process used to identify species for the Grassland follows the USFS Intermountain Region's process that was used to develop a Regional species-at-risk table.

The ***Idaho Bird Conservation Plan*** (Idaho Partners in Flight, 2000) was reviewed for those species that are high priority for the state or the Planning Unit. This list was further refined based on habitats available on the Grassland. Eight species were identified at this step. A review of the ***Atlas of Idaho's Wildlife*** (Groves, *et al.,* 1997) found two additional species that needed to be considered. One additional species was added after a review of the USFS Intermountain Region's Species-at-risk table. Finally, the U.S. Fish & Wildlife Service has identified species of concern for the Caribou National Forest (March 26, 2000). This list was refined to those that have potential habitat on the Grassland. (See Wildlife Process Paper in the project file for more information on the development of the species-at-risk list.)

Table 3.18. Species-at-Risk* and Habitats Used (Groves, *et al*, 1997 and Paige and Ritter 2000)

Species and Status in Idaho	Breeding/Nesting Habitat	Foraging Habitat
Calliope hummingbird **(1)**	Willow and alder thickets. Nests in trees or shrubs.	Tend to feed close to the ground, on nectar, insects and spiders.
Willow flycatcher **(1)**	Mesic and xeric willow habitats. Nest in shrubs.	Catches insects in air or on foliage.
Black-billed magpie **(2)**	Found in open country, open areas with scattered trees, shrubby areas, riparian woodlands, farmlands	Eats insects, carrion, mice snakes, eggs and young of small birds and grains and fruits.
MacGillivrays Warbler **(1)**	Riparian habitat, esp. dry, tall willow areas with grasses and forbs. Nests low in thick shrubs	Forages on insects close to the found in dense vegetation.
Scott's Oriole **(1)**	Riparian woodlands are the only suitable habitat on the Grassland. Nest in trees and shrubs	Forages on leaves of shrubs, primarily on insects, also fruit and nectar
Townsends big-eared bat **(1)**	Wide range of habitats. There are no mines or caves to provide winter hibernacula or maternity colonies.	Forages over foliage of trees and shrubs, on nocturnal insects, esp. moths
Pallid bat **(1)**	Found in shrub-steppe, buildings on adjacent private lands may be used as roosts. No maternity colonies or winter hibernacula.	Captures prey on ground after aerial search, mostly flightless arthropods, crickets, moths and beetles
Yuma myotis **(1)**	No known or potential maternity colonies or winter hibernacula known to be present	Often forages over streams, flying just above the water surface, primarily on small moths
Loggerhead shrike **(2)**	Shrubland and grassland species. Open country with scattered shrubs and trees for nests.	Forages in low vegetation and bare ground, using hunting perches to locate prey (mostly insects, but also small mammals and lizards)

Species and Status in Idaho	Breeding/Nesting Habitat	Foraging Habitat
Short-eared owl **(2)**	Grassland and open sagebrush. Nest on ground in cover, generally grasses.	Voles are primary prey, but also take other rodents, grassland birds and large insects
Long-billed curlew **(1)**	Grassland and areas of short, open sagebrush. Nest on ground in areas of short vegetation.	Forage on insects and invertebrates from the soil, or wet sand and mud.
Pygmy rabbit **(2)**	Dense stands of tall sagebrush, with a high amount of woody cover, in deep soils	Sagebrush is the primary food, but grasses and forbs are eaten in mid- to late summer.

(1)= summer resident
(2) = year-long resident (Stephens and Sturts 1998, Groves, *et al*., 1997).
***** The sage grouse has been discussed previously as a Management Indicator Species and is not listed here.

Sagebrush

The species at risk (SAR) that are associated with sagebrush habitat are associated with varied habitat structures. Loggerhead shrikes do not appear to be tied with specific canopy closure of sagebrush but build their nests in the shrubs (Paige and Ritter, 1999). Short-eared owls and long-billed curlews use the more open sagebrush types (0-5 percent canopy cover) that are dominated by grasses (Paige and Ritter, 1999). Both of these species are listed as breeding in the Grassland latilong[23] (Stephens and Struts, 1997). Currently, about 17 percent of the Grassland sagebrush habitats are in the 0-5 percent canopy cover class. Short-eared owls have been observed nesting in the Sweeten Pond area (K. Timothy, USFS Biologist, pers. comm.). In addition, the State Conservation Data Center has several records of long-billed curlews nesting on the southern unit in the 1980's.

Sage grouse (previously discussed) and pygmy rabbits are associated with greater shrub densities, generally the greater than 15 percent canopy cover class. Pygmy rabbits are associated with sagebrush stands in deep soils, with a tall, dense structure and a high percent of woody cover. The Conservation Data Center shows records for Downey (to the east) and on the western edge of Oneida County (to the west) of the Grassland. The Grassland is within the expected distribution of pygmy rabbits, but historical and current distribution is not known. Much of the Grassland has been heavily modified from farming and plowing and it is not known what effect this may have had on current pygmy rabbit distribution.

A predictive model (Gabler, *et al.*, 2000, and Katzer and Parker, 1997) was used to identify areas of potential pygmy rabbit habitat. This query identified ten areas of potentially suitable habitat on the Grassland. One of these areas was surveyed in December 2000, but no conclusive evidence was found. Additional surveys would be needed to determine the current status of pygmy rabbits on the Grassland.

[23] **Latilongs** are rectangular areas between adjacent meridians of longitude and parallels of latitude and are roughtly forty-seven miles wide by sixty-ninemiles long.

Riparian

Riparian and wetland habitats on the Grassland have been greatly modified by farming, livestock grazing, water diversion, spring diversion and drilling of water wells. Information on historical or current riparian vegetative conditions is very limited. While some surveys included vegetation information, no analysis is available of the potential of stream reaches to support willow communities. Riparian surveys by the Idaho Wildlife Federation in 1997 found that most riparian habitats are in early seral, non-functioning or functioning-at-risk conditions. Functional riparian habitats are found along 17 percent of Rock Creek, including the campground, fenced Highway right-of way and riparian pasture, 11 percent of Meadowbrook and 100 percent of Salyer Creek riparian pasture. Salyer Creek receives very light grazing and displays riparian shrub and aspen communities. Willows and cottonwoods dominate one stream reach of Deep Creek on the upper end of Stone Reservoir.

Riparian greenline vegetation surveys were conducted in the summer of 1999 (Ciccone and Heikkola, 1999). These surveys evaluated five short streams reaches, two of which were outside the area of the previous riparian Idaho Wildlife Federation survey. Sheep Gulch showed a small amount of sprouting willow, but the site was primarily dominated by upland species, such as sagebrush and Wood's rose (*Rosa woodsii*). This site was rated as an early seral site. The Deep Creek site is dominated by willow and cottonwood, but due to the quicksand nature of the substrate, it was not sampled in great detail.

Species at risk (SAR) that have been identified for riparian habitats include the calliope hummingbird, willow flycatcher, black-billed magpie, MacGillivray's warbler, Scott's oriole, Townsend's big-eared bat, pallid bat and *Yuma myotis*. The State Conservation Data Center has two records of Scott's orioles nesting on the Curlew (1975 and 1985). In addition, Sauder (1999 and 2000) found MacGillivrays warblers in his aspen study plots.

All of the bird species mentioned above rely on riparian shrub communities for nesting (Ehrlich, *et al.*, 1988, Groves, *et al.*, 1997). As such, nesting habitat is currently very limited within the Grassland. The bat species may use riparian areas as foraging habitat for insects. Insect populations are expected to vary depending on streamside vegetation. It is assumed that most of the non-functioning and functioning-at-risk stream reaches lack suitable streamside vegetation to provide suitable habitat for breeding birds or foraging habitat for bats.

Tree plantings, cultivation and urbanization have contributed to the expansion of species into new habitats. Since 1900, cowbirds have expanded throughout the west, with the introduction of livestock across the rangelands (Lowther, 1993). Agricultural practices also have increased cowbird winter food supplies. As a result of this range expansion, native bird species are vulnerable to brood parasitism. Riparian bird species such as willow flycatcher and yellow warbler are commonly used as host species (Paige, 1995). Population trend estimates from 1966 to 1994 taken from breeding bird surveys shows large increases in population trends for brown-headed cowbirds for Montana, North Dakota and Idaho. They have also been noted as very abundant on the Grassland (Chuck Trost, ISU Ornithologist, pers comm.). However, Sauder (1999 and 2000) has ongoing bird surveys in the Greater Curlew Valley Area. During the 1999

season he trapped five brown-headed cowbirds, and in 2000 he trapped and banded four brown-headed cowbirds.

During the breeding season, cowbirds prefer grassland vegetation, especially with the presence of livestock. Scattered trees, tree rows or shrubs, such as willow riparian habitats, are favored, where they parasitize nesting birds. As a result, tree rows and willow riparian habitats in areas with abundant cowbirds may serve as "population sinks" for breeding, parasitized birds.

Fisheries

Perennial flowing streams within the Grassland boundary include Deep Creek, Rock Creek, Sheep Creek and Meadowbrook Creek (Leffert, personal observations, 1990-2001; USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969). Specific aquatic habitat features have not been inventoried in any of these streams; however, a riparian properly functioning condition assessment has been completed which evaluates stream channel and riparian hydrology, vegetation, and soils-erosion deposition features (See Watershed Section beginning on page 3-19).

The majority of stream reaches evaluated have been rated as "nonfunctioning," though some stream reaches are considered to be functioning properly or functioning-at-risk (See Table 3.35). Nonfunctioning reaches normally do not contain sufficient in-stream habitat features, such as pools, riffles, and substrate suitable for fish spawning or aquatic life, which reduces the potential for viable fish and aquatic populations within these channels.

Average summertime stream flows on perennial streams within the Grassland are generally small, averaging less than .5 cubic feet per second. In sharp contrast, peak flows from intense, localized thunder storms may exceed several hundred cubic feet per second for several hours then quickly recede to more normal, small base flows (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969; Leffert, personal observations, 1990-2001). Intense flows from these periodic rain events tend to scour the channels and reduce habitat potential within the channels. The combination of small base flows and quickly fluctuating, highly intense, storm flows further reduces the aquatic habitat potential within these streams (Branson, *et al*., 1981; Platts, *et al*., 1985). Additionally, the high velocities associated with the intense runoff flows tend to flush any aquatic organisms downstream that might become established within a given reach.

As a result, overall aquatic habitat potential is limited and supports only a limited fishery. No salmonids have been inventoried in any of the area streams, except Deep Creek above Stone Reservoir and within the reservoir itself (USFS, 2001). Only small, non-game fish, such as shiners and dace, have been inventoried in limited quantities in limited reaches of area streams. No rare, sensitive, threatened, or endangered aquatic or fish species is known to exist anywhere within the Grassland area. Two separate fisheries inventories have been conducted: one during the summer of 1999 by a team of Forest Service and U.S. Fish & Wildlife Service personnel; and one during the summer of 2001 by a crew of Forest Service personnel.

Deep Creek has been dammed and backwaters form Stone Reservoir. Deep Creek Spring, located just above the reservoir, is the primary water source for the reservoir. During the

summer irrigation season a large diversion structure captures and diverts most of the water from Deep Creek Spring, reducing the amount of potential habitat available for fish within and above the reservoir. Stone Reservoir contains a variety of stocked fish, ranging from rainbow trout to channel catfish. Bass, crappie and carp are also reported to be living in the reservoir (D. Skully, IDF&G, pers. comm., 2000). Deep Creek, below the reservoir, contains a population of carp and probably several other species of warm water fish (Leffert, personal observation, 2001). Agricultural diversions below the reservoir reduce the amount of available water, limiting the amount of available habitat below the reservoir.

SECTION 3 - HUMAN USES AND VALUES

Historical and Cultural Value of the Grassland

Archaeological and ethnographical sources indicate the historic and prehistoric use of the Curlew National Grassland included camping, hunting, fishing, grazing, ranching and homesteading. Archaeological investigations of known heritage resources may offer insights into the historic and prehistoric land uses and settlement patterns of the area.

Heritage resources may be identified as those resources either directly or indirectly related to the material lifeways of a cultural group or groups as specified by the Code of Federal Regulations (CFR), 36 CFR 296.3. Heritage resources may refer to sites, areas, buildings, structures, districts, and objects that possess scientific, historic and social values. The Forest Archaeologist, in consultation with the State Historic Preservation Officer (SHPO), determines the significance of heritage resources and eligibility for listing on the National Register of Historic Places (NRHP). The cultural value of the Grassland is significant to local Native American Tribes, ranchers, farmers, and descendants of homesteaders in the region.

Of the twenty-nine cultural sites recorded on the Grassland, fifteen are prehistoric sites and fourteen are historic sites (See 2360 Files in Idaho Falls Headquarters Office). One important prehistoric site is believed to be a multi-component bison and pronghorn processing camp. This site is a critically important regional cultural resource and is eligible for nomination to the National Register of Historic Places. The site also represents one of the very few prehistoric bison kill and processing sites documented within the Great Basin to date. Other recorded prehistoric sites may also represent small hunting camps and contain information critical to understanding the pre history of the region.

Historic sites on the Grassland may be associated with the Hudspeth Trail (1849-1859) that passed through the area as early dry farming homesteaders began settling the area at the turn of the century. Hudspeth's Cutoff was first opened by a large Missouri party, led by Benoni M. Hudspeth and John M. Myers, who had proceeded directly westward from Soda Springs and Sheep Rock. This route led them south of Fort Hall; and then joined the California Trail near City of Rocks in southern Idaho. The cutoff led across the Grassland, and immigrants stopped to rest and water their stock at Twin Springs. Located in the Rockland Valley portion, Twin Springs was the only water available along the cutoff for twenty-two miles after leaving Malad Springs. Remnants of the trail are visible west and east of Twin Springs, and wagon remnants have been observed in the small canyon and creek area south and southwest of the springs. Most trail remnants have been obliterated by farming and ranching developments.

Potential for locating additional heritage resources is dependent on future cultural resource sample surveys of both high and low cultural site probability areas. Heritage resources site locations are not disclosed in this document. In order to protect and preserve heritage resources, detailed descriptions and locations are exempt from disclosure under the Freedom of Information Act as stated in the Forest Service Policy (FSH 6209.13 section 11.12) in accordance with the Archaeological Resources Protection Act (ARPA) of 1979 (16 USC 170hh) and the National Historic Preservation Act (NHPA) of 1966 (16 USC 470w-3) as amended. Such information is

disclosed in full to the State Historic Preservation Office (SHPO) in order to facilitate decisions on sites which should be included on the National Register of Historic Places, or which sites should be designated as significant.

Recent discoveries of paleontological resources within and close to the Grassland have been made. These vertebrate remains are scientifically important, because fossils of this age are virtually unknown in Idaho or surrounding areas. Studies of these fossils are currently underway. The potential is good for additional fossil locations on the Grassland. Recovery of additional specimens from known and yet undiscovered localities would enhance knowledge of the geological time period of 6 to 12 million years ago.

Economic and Social Values

Introduction

Ecosystem management[24] is an ecological approach to land management used by the Forest Service to achieve their mandate of multiple use on National Forest and Grasslands. Ecosystem management blends the needs of people and their environmental values with physical and biological elements to maintain diverse, productive and sustainable ecosystems. As a part of an ecosystem, human conditions are shaped by it, and in turn, shape the ecosystem. The physical and biological parts of an ecosystem offer opportunities and impose limits for people. One area may provide settings and resources for efficient human use or enjoyment, while another area may impose barriers preventing use due to greater costs than potential benefits. A critical element in successful ecosystem management is an understanding of the role of humans within the ecosystem structure and function. Blending the dynamic human condition with the biological and physical resources will help create a credible and inclusive planning process.

The human story, or dimension, of an ecosystem is complex and dynamic. The more information we have on the social, economic and cultural aspects of the citizenry, the richer the story we can tell concerning the general public and their demand for Grassland resources. This human story should be told at several scales, from national to local. Information from a larger area may mask important concerns and trends in a smaller area. It is also important that the story be told from the past to the present and into the future. Trends, changes, and growth in an area should be considered in order to make decisions based on dynamic, not static conditions. Such a robust story gives context to the decisions to be made from a perspective of change, knowing that the current situation has not always been and may not always be.

In telling the story, many variables, both quantitative and qualitative, are considered. This information has been collected from many different sources and it is important to be aware of the assumptions used in both collecting and reporting the data. Not all data are comparable, available at the scales desired, or complete. In the following analysis, data are introduced and assumptions are given to allow the reader to interpret the story told within the context of the data.

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[24] **Ecosystem management** as used by the USDA-FS means the skillful, integrated use of ecological knowledge at various scales to produce desired resource values, products, services and conditions in ways that also sustain the diversity and productivity of ecosystems (USDA-FS, 1994).

This analysis provides a description of the social and economic environment and trends in the southeast Idaho region surrounding the Grassland. This description of social and economic conditions is similar to the more traditional resource inventories and analyses done for such concerns as recreation, vegetation, wildlife, fish and soils. By understanding the human environment, the potential effects of Grassland management and opportunities to mitigate actions can be evaluated through the ecosystem's human dimension.

This social and economic analysis is conducted by the Forest Service to determine what effects the Agency's land management programs may have in the local area and the people using the natural resources of the Grassland. People who value and use the Grassland are part of the ecosystem and have an important role in management decisions.

This analysis of the affected environment is a summary and update of several social and economic documents. Refer to the Project File for the complete documents.

Regional Overview

The importance and extent of social and economic impacts vary based on the perspective of the individual. On one extreme, there are those who would make social and economic needs of the local community, or an even smaller segment of society, of paramount importance above all else. In the opposite direction, some people would like national values and benefits to be the sole consideration in Forest and Grassland planning. Still others would advocate that social and economic factors are of no importance and should be completely disregarded in favor of environmental concerns. The challenge is to find an acceptable balance. Even then, there will be those who will resist acceptance of a final decision.

Long-time residents and locals often have strong historical and emotional ties to the Grassland. They want assurances that resources will be protected, but also that traditional uses will continue to be accommodated, that favored areas are protected, and that changes in management will not have an unacceptable impact on their lifestyles and customs and those of their children into the future.

Additionally, many residents are concerned about what kind of impact changes in management will have on their economic well-being. Grazing permittees rely on the availability of suitable forage on the Curlew National Grassland for grazing livestock. Many local communities rely on the employment and income generated from the use of grassland resources.

Non-local interested parties are also concerned with how changes in management activities will affect their lives. Many of these people may never actually visit the Curlew National Grassland, but draw comfort and satisfaction from the knowledge that the Grassland and its resources exist.

The social and economic environment comprises the people living adjacent to the Grassland, and includes the lifestyles and attitudes of people toward use and access of Grassland resources. The analysis area for the social and economic portion of the Grassland Management Plan revision is Oneida County in Idaho. The Grassland is located entirely within this single county. Oneida County is described below in terms of lifestyle and the level of interest and issues the County has

concerning the Grassland plan revision process. Following these general descriptions, social and economic information will be highlighted and compared. This information provides a basis for context and comparison for decision makers.

Oneida County

Oneida County is boarded to the south by Utah, Franklin County to the east, Cassia County to the west, and Bannock and Power Counties to the north. Major employment opportunities include agriculture, mining, banking, and government. A recent trend in increased property values (USDC, 2001) and residential building in and around Malad City indicate Utahans who work in Ogden and other northern Utah communities are willing to reside in Malad City and commute to these larger metropolitan areas.

The Grassland is used for grazing domestic livestock for local operations. The Grassland also provides upland game bird and big game hunting and a variety of recreational opportunities.

Land Ownership

The Grassland accounts for 47,600 acres, about 6 percent, of Oneida County's 769,400 total acres. Just over half, 53 percent of Oneida County, is in federal ownership with another 35 percent of the county in private farmland. With over half the county in federal ownership, the area is likely to be the directly impacted though potential changes in federal use and access, as well as county funding through payments to states and payments in lieu of taxes.

Demographics

Oneida County is sparsely populated but has grown at rates comparable to state averages during the 1990's. The ten-year growth rate for 1990-1999 at the national level is about 13 percent; Idaho shows significantly higher growth of 25 percent, while Oneida County is lower than Idaho at 19 percent, it is still higher than the national average. Table 3.19 displays population trends from 1991-2000 and the annual average growth rate for Oneida County and Idaho for comparison. Oneida County's annual average growth is much less than the state average, it is positive with the highest growth occurring in the mid-1990's.

Table 3.19. Population for Oneida County and Idaho, 1991-2000

Year	Idaho	Change	Oneida	Change
	People	Percent	People	Percent
1991	1,038,915	na	3,473	na
1992	1,066,490	2.7	3,494	0.6
1993	1,101,204	3.3	3,520	0.7
1994	1,135,459	3.1	3,627	3.0
1995	1,165,000	2.6	3,829	5.6
1996	1,187,706	1.9	3,878	1.3
1997	1,210,638	1.9	3,997	3.1
1998	1,230,923	1.7	4,030	0.8
1999	1,251,700	1.7	4,062	0.8
2000	1,293,953	3.4	4,125	1.6

Source: US Bureau of Economic Analysis, 2001.

Malad City is the only large community within Oneida County. With a 2000 population of 2,158, Malad City accounts for 52 percent of the total county population. In 1990, Malad City accounted for 56 percent of total county population. The decrease is likely associated with people building within Oneida County, but outside Malad City, and commuting into work along the Wasatch Front for employment opportunities.

Table 3.20 highlights some additional population characteristics for comparison of Oneida County and Malad City with the United States and Idaho. Oneida County accounts for 3 percent of Idaho's total population, and has 3.4 people per square mile compared to the state average of 15.6 people; this information highlights the small, rural population surrounding the Curlew Grassland.

Table 3.20. Population Characteristics Compared for the United States, Idaho, and Oneida County, 2000

Source: US Census Bureau, 2001

Variable		United States	Idaho State	Oneida County	Malad City
2000 population	People	281,421,906	1,293,953	4,125	2,158
1990-2000 change	Percent of total	13.1	28.5	18.1	10.9
White	Percent of total	75.1	91.0	97.5	98.0
Native American	Percent of total	0.9	1.4	0.3	0.5
African American	Percent of total	12.3	0.4	0.1	0.2
Asian-Pacific Islander	Percent of total	3.7	1.0	0.6	0.7
Hispanic origin, any race	Percent of total	12.5	7.9	2.3	1.9
65 and older	Percent of total	12.4	11.3	15.9	20.4
Median age	Years	35.3	33.2	36.0	37.8
Persons per square mile	People	79.6	15.6	3.4	na
Seasonal homes	Percent of total	3.1	5.2	6.5	1.4

na = data not available

The diversity in race is limited in Idaho and specifically Oneida County and Malad City as compared to the average United States population. Oneida County and Malad City both have median ages older than the United States and Idaho averages and as a result, a higher percent of the population being is 65 or older. Such statistics may indicate Oneida County, and specifically Malad City, are places local people do not leave upon retirement, and that the area may be attractive to outside people looking for a place to retire.

The percentage of seasonal homes may also support the changing population of Oneida County. Idaho's state average of seasonal homes is 5 percent, while in Oneida County that percentage is 6.5, an increase of 1.5 percent since 1990.

Employment

Table 3.21 highlights employment by sector for 1998, comparing the United States, Idaho, and Oneida County. Because Oneida County has a small population and workforce, disclosure laws limit much of the economic information published through the Census Bureau. It is difficult to compare sectors and trends because of limited information. Table 3.21 uses an economic input/out model, IMPLANpro, to highlight 1998 employment information.

Comparing the distribution of employment by industry sector for Oneida County, Idaho, and the United States shows significant differences with Idaho having 7 percent employment in agriculture, Oneida County 32 percent, and the U.S. only one percent. As a State, Idaho's employment reflects national trends, with higher employment in construction and services highlighting the state's growth and the types of industries locating there. One the other end, Oneida County has higher employment in mining and government sectors, highlighting the resource dependent local economy. The County's limited employment in retail and services indicates that much of the goods and services needed by residents of Oneida County will be purchased outside the county. While this analysis looks only at potential impacts to Oneida County, the interaction of Oneida County with surrounding areas for goods and services should provide additional context for the analysis.

Table 3.21. 1998 Employment Statistics for the Curlew Analysis Area and Idaho

Sector	A.F.F.	Mining	Const.	Manuf.	T.P.U.C.	Wholesale	Retail	F.I.R.E.	Services	Govt
	Percent of Total Employment									
Oneida	32	3	4	3	1	2	13	4	14	24
Idaho	7	0.5	9	11	4	5	18	5	26	15
U.S.	1	0.5	6	12	5	5	17	8	31	14

Source: MIG 2001.

Sectors defined according to Standard Industry Classification Manual, 1987:

A.F.F. (Agricultural, forestry, and fishing services) includes businesses engaged in agricultural production, forestry, commercial fishing, hunting and trapping, and related services.

Mining includes the extraction of minerals occurring naturally, quarrying, well operations, milling, preparation at the mine site, and exploration and development of mineral properties.

Const. (Construction) includes new work, additions, alterations, reconstruction, installations, and repairs of structures.

Manf. (Total manufacturing) includes the processing of materials (products of agriculture, forestry fishing, mining, and quarrying) into new products. Examples include food, textiles, lumber, wood products, furniture, paper, machinery, and appliances.

Retail trade includes the selling goods for personal or household consumption and rendering services incidental to the sale of the goods. Examples include groceries, hardware, drug store, and other specialty stores.

Wholesale trade includes the selling goods to retailers or other wholesalers. Wholesalers maintain inventories of goods, extend credit; physically assemble, sort, and grade goods in large lots, break bulk goods into smaller lots and advertise.

Services include businesses engaged in providing a wide variety of services for individuals, business, government, and other organizations. Examples include hotels; health, legal, engineering, and professional services; and educational institutions.

F.I.R.E. (Finance, insurance, and real estate) includes business that operate in the fields of finance, insurance, and real estate, such as banks, investment companies, insurance agents and brokers; real estate buyers, sellers, and developers.

T.P.U.C. (Transportation, public utilities and communications) includes passenger and freight transportation, communications services, electricity, gas, steam, water and sanitary services and all establishments of the United States Postal Service.

Govt (Government) includes all Federal, state, and local government employees involved in executive, legislative, judicial, administrative and regulatory activities.

Personal Income

Total personal income is comprised of non-farm income, farm income, property income, and transfer payments. The largest component is non-farm income, which includes all wages and salaries that are not directly associated with farming activity. Farm income includes proprietors net farm income, wages and payments-in-kind for farm labor, and salaries of officers of corporate farms. Property income includes income made from rent, dividends, and interest from investments. Transfer payments include several types of income not related to employment such as retirement, disability payments, income maintenance such as social security, food stamps, and WIC assistance, unemployment benefits, and veteran benefits.

Table 3.22 highlights the percent of total personal income within several income categories. Retirement and disability, income maintenance, and unemployment and other benefits are three sub categories of total transfer payments.

Table 3.22. Components of Total Personal Income for the United States, Idaho, and Oneida County, 1999

	Personal Income Component						
Area	Non farm income	Farm income	Property income	Transfer payments	Retirement and disability	Income maintenance	Unemployment and other benefits
	Percent of Total Income						
Oneida	95.4	4.6	18.9	21.3	19.5	1.6	0.2
Idaho	96.7	3.3	19.2	12.8	11.5	1.0	0.4
United States	99.4	0.6	18.8	13.4	11.7	1.4	0.3

Source: Bureau of Economic Analysis, 2001.

Oneida County's personal income related to farming is only slightly higher than the State average, but both Oneida and Idaho have higher farm income contributions than the U.S. average. The average total transfer payment for Idaho, and the U.S. is about 13 percent, with almost 12 percent from retirement and disability benefits. Oneida County is significantly higher with over 20 percent of total personal income coming from transfer payments, and a majority associated with retirement and disability. This is likely due to a large number of people retiring in the area due to lower cost of living and quality of life opportunities. Retirees in a community can have a significant social and economic contribution. Economically their income is an import of money into the community, there is not an associated job or export of product for wages. Retirees also have time and other resources to become involved in a community in terms of leadership, building community capacity, or other social programs that improve the well-being of the entire community.

Due to disclosure of income information within the analysis area, income by sector at the county-level was not available for a 10-year trend period, but using the IMPLANPro model (MIG, 2000) and 1998 data (most recent available). Table 3.23 highlights recent income by sector for each county, the analysis area, and the State of Idaho.

Table 3.23. Labor income by sector for Oneida County, Idaho, and United States, 1999

Sector	A.F.F.	Mining	Const.	Manuf.	T.P.U.C.	Wholesale	Retail	F.I.R.E.	Services	Govt
	Percent of Income									
Oneida	29.2	8.3	5.3	3.3	2.7	1.7	5.4	4.7	11.1	28.3
Idaho	4.6	0.8	10.3	17.3	5.9	5.4	10.2	4.9	22.2	18.3
U.S.	1.3	0.8	6.9	16.7	6.2	6.2	9.0	8.7	28.1	16.2

Source: MIG, 2001.

In general, Idaho and the national averages are similar in terms of the percent of labor income coming from each industry sectors. Oneida County shows significant agricultural industries with a higher percentage of income, 29 percent within the A.F.F. sector. Oneida County also shows a much higher percent of government related income, 28 percent compared to Idaho's average of 18 percent.

In addition to employment opportunities within the County, a portion of Oneida residents bring income into the county from jobs held outside. In 1990, about 37 percent of Oneida County's

total personal income was earned outside the county. Table 3.24 highlights the number of people commuting outside the county, with recent growth from people working in Utah; these figures may underestimate the current situation.

Table 3.24. Work Destinations for People Living in Oneida County – 1990 (16 years or older)

Work Destination	People Commuting
Malad City	633
Oneida County (Other than Malad City)	303
Box Elder County, Utah	299
Cache County, Utah	30
Cassia County	8
Pocatello	6
Other	29
Total County Workers	**1,308**

Per capita income

Annual *per capita* personal income (PCPI) in Idaho in 1999 was $22,871 compared to $28,546 nationally and ranked 45th out of 51 states including the District of Columbia (Bearfacts, 1998-9). Table 3.25 below displays the 1999 *per capita* personal income and average annual growth rate for the analysis area over the past ten years. In 1999, Oneida County's PCPI was 67 percent of Idaho's PCPI, and only 54 percent of the United States. Oneida County's low *per capita* income may further highlight the rural and agricultural lifestyle and economy of the area.

Table 3.25. *Per capita* Personal Income and Average Annual Growth Rates for Analysis Area, 1999

Area	Per capita Personal Income	Average Annual Growth Rate
	Dollars	**Percent**
Oneida	15,412	2.8
Idaho	22,871	4.4
United States	28,546	4.4

Source: Bureau of Economic Analysis, Regional Economic Information System, Bearfacts, 1998-99).

Grassland Resource Related Industries and Resources

This section focuses on the local industries that use grassland –related resources: recreation and tourism, and grazing. These are the industries that may be directly dependent on grassland-related resources and are the most likely to be impacted (positively or negatively) by the Grassland management. These industries' production activities occur inside and outside the Grassland, and in many cases, the Grassland is not the only source of the resources, similar activities occur on private lands throughout the county.

Data for the following analysis is from IMPLANPro models (MIG 2000). This data allows for the separation of specific sectors and includes detailed information not available from other state or Federal data sources. The trade-off is that the latest data available is for 1998. Other sources of current data are available and were used in earlier descriptions of the economic conditions. Table 3.26 displays employment and income by sector with grassland-related activity summarized as a separate 'grassland-related' category. The grassland-related category includes all direct, indirect, and induced impacts of grazing and visitor industry activities that may be supported by Grassland resources or outputs. For more information, refer to Appendix B and the Project File.

Table 3.26. Role of Grassland Service-Related Contributions to the Area Economy, 1998

	Employment		Labor Income	
Industry	**County Totals**	**Grassland-Related**	**County Totals**	**Grassland-Related**
	Average Annual Jobs		**Millions of Dollars**	
Agriculture	550	16	9.8	0.7
Mining	56	0	2.8	0
Construction	75	0	1.8	0
Manufacturing	46	0	1.1	0
TPCU	23	0	0.9	0
Wholesale trade	35	1	0.6	0
Retail trade	230	5	1.8	0
F.I.R.E.	73	1	1.6	0
Services	251	3	3.7	0
Government	432	3	9.5	0.3
Total	1,770	29	33.5	1.1
Percent of Total	100	1.6	100	3.4

Source: MIG, 2001.

Table 3.26 highlights the limited role the Grassland plays in the analysis area economy. The outputs provided on the Grassland are important to individual businesses and local communities, but in terms of the functioning economy surrounding the Grassland, Grassland-related outputs account for 1.6 percent of the employment and 3.4 percent of the labor income.
More people are using the Grassland in many different ways affecting a variety of resources. The overall level of use is expected to continue to increase in the future and will not be uniformly applied across all Grassland resources. Use will not be distributed over the landscape in the same proportions as in the past. Human use is expected to increase simply because population projections show the area and the nation as a while will continue to grow as discussed above. Population growth puts pressure on Grassland resources whether in the form of those using the Grassland for its amenities or those seeking Grassland products.

The following analysis describes some historical trends and current situation of the three grassland resource-related industries within the analysis area. For specific information concerning these resource outputs on the Grassland, refer to the individual resource sections in this document.

Minerals: Currently, the only minerals management occurring on the Grassland is a small gravel pit operated by Oneida County. The specific area has been included in a land trade in

2001, and ownership of the gravel area has been transferred to the County. Because of this, any potential impacts of the gravel activity have not been included within this analysis.

Range: The Grassland is open to grazing with a few exceptions, such as campgrounds, administrative sites, Sweeten Pond, or other acres designated as not suitable for grazing. About 98 percent, or about 46,594 acres, are suitable for domestic livestock grazing. Grassland forage is an important product of the Grassland, supporting two grazing associates. The Curlew Valley Cattle and Horse Association is compromised of twenty-one members who own base property in the Curlew Valley, and the eight- member Buist Fields Association, most of who reside outside the Curlew Valley. Table 3.27 highlights the permitted use and authorized use between 1997 and 2001. Authorized use reflects the number of head months for which grazing fees were collected.

Table 3.27. Permitted and Authorized Use on the Curlew National Grassland, 1997-2001

Source: USDA Forest Service, Curlew National Grassland

Year	Permitted use	Authorized use [1]
	Head Months	
1997	21,400	18,325
1998	21,400	19,370
1999	21,400	18,619
2000	21,400	20,531
2001	21,400	20,531
Average	21,400	19,489

[1] In drought years, permittees moved off the Grassland earlier in the year and did not return. Authorized use does not reflect this reduction.

Livestock production from the Grassland is important to the people who hold grazing permits. Overall, the Curlew Grassland plays a minor role in the total production of cattle in Oneida County. The total head months on the Grassland in 1997 were approximately 7 percent of the total head months available in the County (Census of Agriculture 1992; Forest Service grazing records).

Local ranchers with grazing permits have an interdependent relationship with the national grassland. The public lands provide livestock forage for part of the year; with the permittee providing forage for the remainder of the year. Any increase or decrease in grazing opportunities from the Grassland may cause adjustments in herd sizes or other factors related to permittees' livestock operations and affect efficient grazing use of their own lands.

Recreation and Tourism

Recreation visits to the Grassland have increased an average of four percent per year and the trend is likely to continue. Developed site uses, camping and picnicking, will likely increase as the analysis area's population continues to increase. Recreation use may increase at a higher rate due to the growing popularity of all terrain vehicles, mountain bikes, and snow machines. Fishing and boating are also popular activities in the study area, but most use occurs on private irrigation reservoirs. The majority of recreation activity in the area is related directly to wildlife including hunting upland birds, rabbits, waterfowl, and deer as well as a growing interest in wildlife viewing and bird watching.

Federal Payments to Counties

Counties containing federal lands are entitled to payments from one or more federal revenue programs authorized by a long list of federal legislation. These payments help support county responsibilities such as road maintenance and education, and are often important to a county's financial health. Management decisions about levels of outputs provided from the National Grassland affect these payments. The following is a discussion of three payments made by the Forest Service to Oneida County.

Payments in Lieu of Taxes

Under the Payments in Lieu of Taxes (PILT) Act of 1976, counties receive payments from the federal government for having federal lands within their counties to make up for lost property taxes revenues. Congress appropriates PILT payments based on a complex formula developed at a national scale using population and acreage of federal lands and the value of other federal revenues as key factors. The final annual PILT appropriation is not only based on the formula but is also sensitive to politics and other national funding priorities from year to year. Due to the complexity of the development of PILT payment values, past PILT payment amounts should only be used as a general indicator of possible future PILT values, and never as a guarantee of future revenues to counties. For the preceding reasons, changes in individual forest plans may not be good predictors of local PILT payments (Bill Howell, WO-BLM, personal communication, 7/14/00). Table 3.28 displays the amounts of PILT payments to Oneida County for the last ten-year period to highlight the absolute and relative values of this payment over time.

Table 3.28. PILT Payments to Oneida County, 1992-2001

Date	Total Payment
	Dollars
1992	166,635
1993	166,630
1994	160,101
1995	154,508
1996	170,384
1997	180,569
1998	188,115
1999	193,290
2000	206,736
2001	296,806
Ten-year average	188,377

Source: USDA Forest Service, Inventory and Monitoring Institute, USDI Bureau of Land Management.

The Grassland accounts for about 12 percent of the total federal land ownership within Oneida County. Assuming the Grassland also accounts for 12 percent of the total PILT payment to the County, the ten-year average contribution from the Grassland is about $22,600. As stated above,

the PILT payment is determined by several factors outside the management and outputs of the Grassland. It is unlikely any of the alternatives will change the level of annual PILT payments.

Twenty-Five Percent Fund

Under the Twenty-Five Percent Fund Act of 1908, counties receive payments from the federal government equal to 25 percent of gross receipts taken in from National Forest system lands. A formula is used to allocate these funds to counties in large part on acres of national forest and but also on other factors. The funds may be spent on public schools or roads in the county. Table 3.29 displays the 25 percent payments made to Oneida County in recent years. Under the 'Secure Rural Schools and Community Self-Determination Act of 2000," the method of determining these payments could be selected by each county. Recognizing recent losses to many counties of income from reduction of traditional uses on federal lands and fluctuating payment amounts, the law offers counties a choice to continue receiving the 25 percent payment, or select a different method of payment that would increase compensation, and stabilize payment levels from year to year. Oneida County selected payment under the new legislation, with a 2001 National Forest payment of $23,000. The 25 percent payments are related only to National Forest system lands and must be spent on public schools (30 percent) and road (70 percent). Grassland payments were excluded from the legislation. The County also receives additional 25 Percent Payments from receipts collected on BLM-administered land. Those payments have not been considered in this analysis.

Table 3.29. 25 Percent Payments to Oneida County, 1995-2001

Year	Total Forest Service Payment [1]
	Dollars
1995	13,148
1996	18,097
1997	19,075
1998	19,743
1999	17,487
5-year average	17,510

[1] Includes Forest Service payments to Oneida County from the Sawtooth and Caribou National Forests only.

Bankhead-Jones Farm Tenant Act Grassland Payments

Bankhead-Jones legislation allows for the use of receipts from management of National Forest System lands on the units from which they were earned. Collectively, these funds are called Conservation Practice (CP) dollars. On the national grasslands, CP dollars have historically been obtained from grazing receipts. Twenty-five percent of these CP dollars must be returned to the Treasury. The remaining 75 percent may be used for a combination of conservation practices (50 percent) and for grazing association administration (no more than 25 percent). The Forest Service and the Grazing Association board develop a list of required conservation practices, which the grazing association then implements these conservation practices and the grazing fees

paid to the Forest Service are reduced accordingly. Table 3.30 displays recent payments and a five-year average, using this formula and authorized livestock use from District records (Malad Office, Westside Ranger District).

Table 3.30. Curlew Grassland Bankhead-Jones Payments, 1997-2001

Year	Grassland Payment
	Dollars
1997	3,092
1998	3,269
1999	3,142
2000	3,465
2001	3,476
5-year average	3,289

Recreation Uses

Developed and Dispersed Recreation

As an area's population increases, so does the demand for outdoor recreation. Southeastern Idaho's population has increased by over 10 percent between 1980 and 1995 (SCORTP, 1999, pg. 23). Recreation on the Grassland includes driving for pleasure, camping, hunting, fishing, wildlife viewing and snowmobile use. Forest staff estimate recreation use is increasing on the Grassland between three and five percent per year. This trend is likely to continue.

The Recreation Opportunity Spectrum, or ROS, is a system used by the Forest Service to characterize the degree to which landscapes have "evidence of humans" and the setting they offer visitors. The existing recreation setting of the Grassland is "roaded natural-appearing." The characteristic landscapes of the valley are gentle rises of sagebrush and agricultural fields. Due to the intermingled land ownership of the area, numerous roads and agriculture facilities are visible from most travel ways. Visitors do not expect a pristine, unaltered landscape, but settings are "natural appearing" or rural in nature.

Curlew Campground and Group Area, Twin Springs Campground, and Sweeten Pond are developed recreation sites on the Grassland. Camping and group use at Curlew Campground is high. To accommodate growing use, the campground was expanded in 1992, and a new group area was built in 1998. The site is adjacent to Stone Reservoir, which is owned by the local irrigation district. The site is popular for boating, fishing and ice fishing. Curlew Campground is used to capacity early in the spring and summer when fishing is good and the daytime temperatures are not too hot.

Use at Twin Springs Campground is low, except during the fall hunting season when weekend use picks up. Portions of the Hudspeth Cutoff trail are adjacent to Twin Springs. The Hudspeth Cutoff was an alternate route for a portion of the Oregon-California Trail. Some visitors stop at Twin Springs to see wagon ruts associated with the historic trail.

Sweeten Pond, an artificial impoundment, offers waterfowl and wildlife viewing. The site could be further developed for wildlife viewing and interpretation. The site is fenced to protect it from livestock grazing. Sweeten Pond and other areas on the Grassland provide opportunities to interpret local flora and fauna, early homesteading and grassland management. Table 3.31 displays the capacity, season, and estimated use of developed recreation facilities on the Grassland.

Table 3.31. Capacity, Season, and Estimated Use of Developed Facilities Curlew National Grassland

Developed Site	Site Features	Capacity (PAOTs [1])	Managed Season Days/year	Estimated Use (RVDs [2])
Curlew Campground & Group Area	8 family camp spurs 6 multi-family spurs	110	198	13,000
	15-car parking lot for boat ramp users	75	365	3,000
	200-person group area	200	198	24,000
Twin Springs Campground	8 family camp spurs	40	134	2,000
Sweeten Pond	10-car parking lot	50	365	2,000

[1] PAOTs "People at one time," a measure of site capacity assuming five people per vehicle

[2] RVDs "Recreational Visitor Days

Much of the dispersed recreation on the Grassland is dependent on wildlife. Dispersed use follows the ups and downs of wildlife populations. Hunting upland birds, rabbits, waterfowl and deer are popular pursuits. In the state of Idaho, deer hunting has decreased over the last ten years, but upland game and waterfowl hunting has increased (IDFG license data, 1989-1999). Based on Forest staff observations, deer hunting has declined on the Grassland. Bird hunting appears to be static. Bird watching, especially on the sage and sharp-tailed grouse strutting grounds, grows in popularity annually. In March and April of 1997 over 150 people spent two to four hours watching the birds "dance." The numerous leks, or dancing grounds, are generally found in open areas adjacent to sagebrush cover throughout the Grassland.

Travel

The Grassland and intermingled private lands have 77 miles of paved and high-standard gravel roads. State Route 37 from Rockland to Snowville, Utah provides north-south access. State Route 38 from Malad to Holbrook provides east-west access. Low standard gravel roads provide additional access to recreation areas, range improvements, and private lands. There are no designated recreation trails on the Grassland. Some motorbike and ATV use occurs on the primitive roads. A Roads Analysis was conducted in September 2001 that identifies opportunities to improve roads needed to access the Grassland. (See Project File for full report)

Off Highway Vehicles (OHVs) are defined as any motorized wheeled vehicle designed for cross-country travel over any type of terrain. OHVs include sport utility vehicles, motorcycles and all-

terrain vehicles (ATVs). OHV use is a valid recreational activity on public land. (FS Manual Direction).

Travel is regulated by a travel plan on national forests and grasslands. The travel plan is a map that depicts roads and trails, and the type of travel allowed on specific travelways or within designated areas. The Caribou National Forest's travel plan allows OHVs to travel cross-country from August 31 to December 1 within the Grassland. Cross-country travel is defined as motorized travel off of designated roads and trails. OHVs are restricted to designated routes from September 1 to November 30 for prevention of soil erosion, wildlife protection and grassland management. A designated route is a specific road or trail, identified by the Forest Service, where some type of vehicle use is allowed either yearlong or seasonally. The travel plan does not restrict over- the- snow vehicles on the Grassland.

It appears most noxious weed invasions are occurring along system and user-created roads and within developed recreation areas (Curlew Roads Analysis Report, 2001). Motorized cross-country travelers are creating new travelways through repeated and casual use. More than eight miles of travelways have been created in the last three years by full size 4-wheel drive vehicles.

Visual Quality –Scenery Management

People value visually attractive and natural-appearing landscapes. The scenic values of the Grassland are important to the public. At the time of the 1985 Forest Plan, the Forest Service used the Visual Management System (VMS) to assign visual quality objectives to areas of the forest and the Grassland. The objectives were designed to maintain or improve scenic quality. (USDA-FS, VMS Handbook)

The landscapes of the Grassland have visual quality objectives of Partial Retention and Modification. Partial Retention allows management activities that remain visually subordinate to the natural landscape. An objective of Modification allows activities and facilities that may dominate the landscape, but must repeat the forms, lines, and textures of the characteristic landscape.

In 1997 the Forest Service revised the VMS Handbook. The new handbook is entitled ***Landscape Aesthetics: A Handbook for Scenery Management***. The Grassland will be managed under the original VMS handbook, using the visual quality objectives of Partial Retention and Modification. The new Scenery Management System will be implemented on a site-specific basis as part of project or landscape analysis.

The scenery of the Grassland meets the Visual Quality Objectives of Partial Retention and Modification, with the exception of areas with several user-created travelways created by cross-country OHV use**.**

Special Management Areas

Wilderness/Roadless Areas

Inventoried roadless areas are public lands typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act of 1964. The most recent Forest inventory does not show any tracts of land within the Grassland. No unroaded areas or undeveloped areas exist on the Grassland to consider for wilderness designation. No areas have been identified that are of sufficient size or offer a unique "wilderness" challenge to warrant a wilderness recommendation. The Grassland has a rural setting with extensive roads and agricultural facilities.

Inventoried Roadless Areas

The Grassland contains no inventoried roadless areas (USDA-FS, 1985).

Wild & Scenic Rivers

In October 1997, the Caribou National Forest established an interdisciplinary process to review more than 200 streams on the Forest for possible Wild and Scenic River eligibility. The scope of the eligibility evaluation was defined by watershed and Forest boundaries. The following streams on the Grassland were assessed during this process: Rock Creek, Meadowbrook Creek, North Creek, SF Rock Creek, Deep Creek, Sweeten Pond, Wood Creek, and Sheep Creek (See Wild & Scenic Rivers Eligibility Report, May 1998).

Rock Creek was the only stream on the Grassland identified as having a potential prehistoric "outstandingly remarkable" value. Rock Creek extends for 5.5 miles, from its spring headwaters to the Grassland boundary. A prehistoric site has been identified and surveyed. The prehistoric site contains lithic scatters and rock blinds dispersed across the area. The site was most likely used by the Northern Shoshone tribes and possibly the ancient Fremonts. It is unknown if the site holds sacred meaning to local Indian tribes.

The historic portion of the river corridor consists of the area at the Twin Springs Historic Camp. Settlers may have used the area as a stopover on their migration west, since the Hudspeth Trail is close by and still displays visible wagon tracks. The area may have importance to visitors with an interest in early American west history. The developed Twin Springs Campground and interspersed private in-holdings in the area limit the site's integrity.

Rock Creek appears to be incidental to the Hudspeth Trail, but the springs located there were used extensively by the emigrants and even earlier by aboriginal groups in the area. At one time, the area was known to have a dance hall within the campground area, but it was either torn down or burned in the early 1900's. The Hudspeth Trail is marked by an historical marker and is eligible for listing in the National Register of Historic Places.

Although the site has some historical importance, it is not outstandingly remarkable when compared to other emigrant trails in the regionally comparative area, such as the Oregon Trail, or prehistoric sites such as Weston Canyon rock shelter.

No streams on the Grassland were found to be eligible for further Wild & Scenic River study.

Research Natural Areas

Research Natural Areas (RNAs) are areas within National Forest System land that the Forest Service has designated to be permanently maintained in natural condition. These natural areas include: unique ecosystems or ecological features; rare or sensitive species of plants and animals and their habitats; and high-quality examples of widespread ecosystems. This national network of Research Natural Areas helps protect biological diversity at the genetic, species, and ecosystem and landscape scales. RNAs that are representative of common ecosystems in natural condition serve as a baseline or reference area. To help answer resource management questions, the baseline of RNAs can be compared with similar ecosystems undergoing silvicultural or other management activities. In this way, RNAs make an important contribution to ecosystem management.

Eight Research Natural Areas have been established on the Caribou National Forest. None of these "Established Studies" identified any part of the Grassland as a likely area for a Research Natural Area. This is due to the highly modified landscape discussed previously in this chapter. None of the activities proposed in any alternative, however, would preclude listing in the future. Several research projects have been conducted and are being conducted on the modified landscape.

Water Uses

Water is limited throughout the area. Springs and wetlands are limited in extent. Stream flows are naturally low - only a few perennial streams occur within the entire area. Agriculture and grazing are the primary uses within the area. Live water is generally tapped and diverted to agricultural fields or used to water livestock. A major impoundment on Deep Creek (Stone Reservoir) was built for agricultural interests. The water that enters the reservoir is diverted to surrounding croplands. The value of this water ranges from $150/share up to $500/share depending on the source and where it is delivered. Shares vary in quantity, but are normally measured as water 1 inch deep covering one acre (also termed acre-inch).

Reserves/Preserves

Reserve and/or preserve management is most typically associated with primitive settings, with little or no evidence of humans. The Grassland does not provide a setting with primitive or wilderness characteristics. It offers little opportunity for solitude or challenge. The landscapes would not be described as having "high natural integrity." The "evidence of humans" is obvious to most visitors.

The characteristic landscapes of the valley are gentle rises of sagebrush and agricultural fields. Livestock have grazed the area for many decades. Intermingled land ownership has created a system of roads and agriculture facilities. Visitors do not expect a pristine, unaltered landscape. The setting is "roaded -natural appearing" or rural in nature.

Livestock grazing is prohibited in campgrounds, at Sweeten Pond, and along the tree rows. Of these areas, the only site that remotely offers a "reserve" setting is Sweeten Pond, about 225 acres of developed ponds, wetlands, and uplands. The two ponds are artificially maintained by a well and pump. The ponds and adjacent uplands offer a haven for migrating waterfowl and other wildlife.

Livestock Grazing

Livestock grazing is a permitted use on the Grassland. Grazing agreements with Grassland grazing associations allow use of forage produced on the Grassland. Livestock grazing in the Curlew Valley is an important industry to local ranchers and residents in Oneida County. Local ranchers with grazing permits have an interdependent relationship with the Grassland, in that the Grassland provides livestock forage for part of the year with the permittee providing forage for the remainder of the year. Any increase or decrease in forage provided from public land may cause adjustments in herd sizes or other factors related to permittees' livestock operations. On the Grassland, cattle are the only type of livestock permitted. Coordinating livestock grazing with other land uses and management activities is the responsibility of the Forest Service. For example, livestock must share the rangelands with wildlife that also depend on these lands for forage and cover through the year.

Since the Forest Service assumed administration of the Grassland in 1954, two increases in permitted livestock numbers have occurred - a 350 head increase in 1965 and a 287 head increase in 1968. These increases were made possible because intensive management practices and improved water developments were implemented (See 2230 Files at the Malad Office of the Westside Ranger District).

Grazing Associations on the Grassland

Today, the Grassland is administered under two separate grazing associations. The Curlew Valley Cattle and Horse Association is comprised of twenty-one members. Each member must have base property in Curlew Valley. The Association has limited the maximum number of cattle each member may graze to no more than 200 head, although most members generally run fewer. If a member had an opportunity to acquire another permit, the Association by-laws would not allow that member to graze more than a total of 200 head of cattle. The by-laws are intended to provide support to the local rancher and to prevent a large corporate business from taking over all the permits. The Curlew Valley Association grazes approximately 85 percent of the Grassland in thirty-seven fields using a deferred-rotation grazing system. Currently, the Association is permitted 2,454 cow/calf pairs from April 16 to November 30 each year, for a total of 18,476 head months. Stocking levels have ranged from a low of about 70 percent to a high of about 96 percent over the last twenty years based on a variety of factors, including brucellosis incidence, drought, and economics. Non-use by individual permittees in this

association does not allow members to fill in behind a member taking non-use (Grazing Agreement, 2001 and 2210 files at the Malad Office of the Westside Ranger District).

The Buist Fields Association has eight members, with several members residing outside the Curlew Valley. The Buist Association grazes approximately 8,000 acres in twelve fields under a deferred-rotation grazing system. They are permitted 862 cow/calf pairs from April 25 to July 9 and from November 1 to November 30 for a total of 3,004 head months. During the summer months, the Association has grazing permits in other areas. The Buist Association allows members non-use, but it also allows other members to fill in with other livestock. As a result, the Buist fields receive 100 percent actual use annually. Generally, all of the fields have been used by the time livestock move off the Grassland in July, and typically livestock do not return until the following year (2210 files at the Malad Office of the Westside Ranger).

The current grazing agreements with the two grazing associations permit approximately 21,480 head months on 46,594 suitable acres.

In both associations, cattle are divided into groups and rotated through the fields, based on an average use of 60 percent per field. If a field is used early one year, it is usually delayed until later in the season the following year. Groups of cattle tend to stay together each year, but the fields that are grazed change so that no group of cattle gets the benefit of better fields or easier moves. The Curlew Association moves through the field rotation in five groups, while the Buist Association moves through their field rotation in three groups. If any of the groups meet the utilization rate in all their pastures prior to the end of the grazing season, they come off the Grassland. No pasture is used more than once per season. (See Annual Operating Instructions)

Permittees are required to fund all new range improvements and maintain all existing ones. New improvements can be funded through Conservation Practices (CP) Funds that consist of 50 percent of their current grazing fees ($1.35 per head month for 2001). Maintenance of existing improvements is at the expense of the associations (Grazing Agreement, 2001).

Since 1997, the perennial waterways, except North Canyon, Grandine Horse and Bull Pasture, Huffman Springs and sections of South Fork Rock Creek, have been fenced into riparian pastures where grazing is allowed on a short-term, closely monitored basis. Exclosures have been fenced in the lower Salyer Creek riparian area, sections of South Fork Rock Creek along the Rockland highway, and in the Northwest Peterson-Lonigan field. No grazing is allowed in the exclosures.

Rangeland Capability and Suitability

In April 2000 rangeland capability was mapped for the Grassland using a Geographic Information System. Criteria for the capability analysis included: areas with less than 45 percent slope; areas producing more than or having the potential to produce an average of 200 pounds of forage per acre on an air dry basis; areas with naturally resilient soils that are not unstable or highly erodible; areas where ground cover (vegetation, litter, rock greater than ¾ inches) is sufficient to protect soil from erosion, usually 60 percent unless local data is available for use in setting more specific ground cover requirements; areas accessible to livestock; and areas within 1.5 miles of water or where the ability to provide water exists (R-4 Protocol for Rangeland Capability and Suitability Determinations for Forest Plan Revisions). Since capability is an

assessment of the biophysical characteristics conducive to livestock grazing, the number of acres capable of supporting livestock grazing does not vary between alternatives.

The determination of rangeland capability showed all acres on the Grassland are capable of supporting livestock. The capability determination ***is not a decision to graze livestock*** on any specific area of land, nor is it a decision on livestock carrying capacity.

Suitability, on the other hand, considers the appropriateness of livestock grazing for a particular land area based on the economic and environmental consequences and considerations for other uses that may be affected by livestock grazing. All or a portion of the suitable acres could change under the different management options proposed in the range of alternatives. Each of the alternatives proposes a set of goals, objectives, standards and guidelines. Livestock grazing suitability is determined by alternative, based on whether livestock grazing is compatible with management direction in that alternative. Suitability criteria include: rangeland capability; management area prescription; areas closed to grazing, such as wildlife exclosures; fenced administrative, special use, or recreation facilities; key wildlife habitat areas; unique habitats; areas where the social consequences and values foregone are not acceptable (R-4 Protocol for Rangeland Capability and Suitability Determinations for Forest Plan Revisions). The number of suitable acres for livestock grazing will usually vary between alternatives.

The determination of rangeland suitability in each of the alternatives through the application of management prescriptions ***is a decision to graze livestock*** on a specific area of land, but it does not determine livestock carrying capacity. Livestock carrying capacity is determined through site-specific allotment management plans that must be consistent with the goals, objectives, standards and guidelines in the Land and Resource Management Plan for the area.

An important component of range management and the calculation of livestock grazing levels is the ability of the land to produce forage. Table 3.16 displays the average forage production expected from various vegetation types found on the Grassland. The "Average production per acre per year" column reflects conservative estimates of forage production based on existing acres of vegetation. They are applied as a coarse filter to help determine effects of the various utilization levels described in the alternatives and will not be used to set specific stocking levels. ***Productions figures do not represent absolute peak biomass production, nor do they account for additional fall growth. They do not represent absolute production values or the range in productivity for a given site due to climatic variability or site-specific conditions. This data is not to be used for stocking rate determinations without other supporting data and site-specific analysis.***

The computation formula provides an estimated figure referred to as "head month." A head month is defined as the amount of forage needed to support one animal for one month regardless of the type of animal (Glossary, SRM, 1994). For example, a cow/calf pair grazing a particular area for one month equals one head month, if the calf is less than six months of age when it enters the Grassland. In general terms, it is estimated that a cow/calf pair consumes approximately 34 pounds of forage per day. Table 3.32 shows the total potential existing ***average*** production based on existing vegetation types.

Table 3.32. Total Existing Average Production Per Year on the Curlew National Grassland by Native, Crested Wheatgrass, and Bulbous bluegrass sites[1]

Capable Acres	Predominant Vegetation Type	Existing Avg. Production Per Acre/Per Year (Air dry weight)	Total Existing Avg. Production Per Year
12,000	Native	700 lbs/acre/yr	8.4 million lbs/yr
30,400	Crested Wheatgrass	1,100 lbs/acre/yr	33.4 million lbs/yr
5,200	Bulbous Bluegrass	500 lbs/acre/yr	2.6 million lbs/yr
47,600			**44.4 million lbs/yr**

1 See Appendix G for more information on calculations.

Forage production varies depending on sagebrush canopy cover and vegetation present in the understory. A second calculation, using sagebrush canopy cover, was completed to insure conservative forage production numbers were used to calculate potential head months at the Grassland scale.

In the second calculation, district transect files and information from the Interior Columbia River Basin Ecosystem Management Project (Rittenhouse and Sneva, 1976; Robert Kindschy, 1994), professional assessments by Dr. Alma Winward, Rangeland Ecologist, USFS, Intermountain Region, Ogden, Utah, and research on production under sagebrush canopy conducted near Holbrook, Idaho (Hull and Klomp, 1972) were used to arrive at estimates of forage production by sagebrush canopy cover classes. Each of the production calculations resulted in various vegetation production levels (high, medium, and low) and a range of potential head months for each alternative (See Appendix G). ***Stocking levels and grazing capacity are determined at the site-specific level in the Allotment Management Plan process.*** Table 3.33 shows how the mid range of production was calculated as an example only.

Table 3.33. Mid Range Estimated Forage Production Under Three Sagebrush Canopy Cover Classes Curlew National Grassland, 2000

Sagebrush Canopy Cover Class	Estimated Forage Production Per acre/per year[1]	Capable Acres[2] in each Canopy Cover Class	Total Average Annual Production Millions of lbs.
0-5% canopy cover	**1,400 to 1,600 pounds per acre per year**, with best sites at 1,800 pounds per acre per year	**8,092**	**12.1 Million**
6-15% canopy cover	**1,200 to 1,400 pounds per acre per year**	**11,424**	**13.1 Million**
> 15% canopy cover	**500 to 1,200 pounds per acre per year**, with some areas as low as 50 pounds per acre with maximum sagebrush canopy cover density and with the presence of annuals and bulbous bluegrass.	**28,084**	**14.0 Million**
Total		**47,600**	**39.2 Million**

[1] A mid point of 1,500 pounds per acre per year was used for the 0-5% sagebrush canopy cover class. Because calculations based on different data points produced a lower number in some calculations, 1,150 pounds was used for the 6-15% sagebrush canopy cover class. The lowest production figure of 500 pounds was used for the greater than 15% sagebrush canopy cover class. (See Appendix G)

[2] Acres include all vegetation types on the Grassland.

A range of potential head months was calculated based on the current utilization rate of 60 percent. ***It should be understood these calculations are very general and provide only estimates. Capacity and stocking levels may vary by allotment, based on site-specific conditions that are not reflected in the calculation. Computations of potential head months should not be used or extrapolated to establish stocking levels or capacity without site-specific analysis.***

Based on a range of estimated forage production on the Grassland and using the current 60 percent livestock utilization rate applied to suitable acres, the Grassland could potentially support from 19,600 to 27,900 livestock head months with consideration for other resources, such as watershed and riparian condition, wildlife needs, or other resource objectives.

PASTURE MAP HERE

Utility Corridors

Approximately eighteen miles of utility corridors exist on the Grassland. Of these, fourteen miles are telephone lines and four miles are power line. These corridors and associated uses are authorized by special use permit. Generally, the special use permit for each corridor requires a corridor management plan. All of these utility lines were designated for long-term management as corridors in the 1985 Land and Resource Management Plan for the Caribou National Forest and Curlew National Grassland. The management of these lands as corridors is not expected to change with this amendment.

Locatable, Leasable, Saleable Minerals and Mineral Materials

The potential for locatable minerals is low on the Grassland. The potential for leasables is low to unknown (USDA-FS, 1985). If interest or demand for locatable or leasable minerals increase over time, a site-specific analysis would be completed prior to development

Two gravel pits currently exist; one pit was included in land exchange proposal in 2001 between the Forest Service and Oneida County; the other is an active pit on the Arbon Valley Road. Other pits exist on the Grassland and have been reclaimed or are currently inactive.

Potential minerals development will not be analyzed or discussed further in this document.

Oil and Gas Leasing

The potential for Oil and Gas is low based on Bureau of Land Management estimates (BLM letter, October 19, 1995). If interest or demand for Oil and Gas leasing increases over time, a site-specific analysis would be completed prior to development and will not be discussed or analyzed in this document.

Irrigation Ditches

Approximately five miles of irrigation ditches occur on the Grassland. These ditches were installed in the 1920's and 1930's for irrigation on homesteads in the Curlew Valley and are administered by the Department of Interior easements. The Delmar Irrigation Company owns the water. These ditches are used primarily for irrigating agricultural crops and secondarily as water for wildlife and livestock. These ditches are not considered riparian areas.

SECTION 4 – ISSUES DISCUSSION AND BASELINE INDICATORS

This section presents a discussion of the affected environment as it relates to the issues generated from public scoping efforts. Issues and issue indicators identified in Chapter 1 are repeated here with a baseline to show existing condition. This is the baseline against which the effects of the alternatives will be measured in Chapter 4. Some issues have several parts. Each part is discussed separately. The issues appear in the same order as they appear in Chapter 1.

Issue 1 - Riparian and Watershed Condition

Watershed Condition

Issue Statement:	Watershed condition and stability on portions of the Grassland are below potential and need to be improved through restoration of natural soil protection features, including microbiotic crusts (mosses, lichens, cyanobacteria, cryptogams, and liverworts).
Issue Indicators:	Maximum acres disturbed at one time during the 10-year plan period Potential erosion rates in tons/year over natural erosion rates
Indicator Baseline:	**7,400 acres** disturbed in year 4 Potential erosion rate of **10,360 tons** per year[25]
Spatial Scales Used for Analysis:	Greater Curlew Valley and Curlew National Grassland
Temporal Scale:	45 Years

Watersheds within the Forest Service portion of the Grassland boundary have been evaluated for condition using a rapid assessment process developed by the Forest Service for use by four Forest Service regions in the Inland West. Watersheds are rated on vulnerability to disturbance, geomorphic integrity and water quality integrity. The rating is expressed in terms of numeric value of 1 through 3, with 1 being the best. Vulnerability to disturbance is described by the amount of the watershed containing sensitive lands, as described in the soil inventory of the Curlew National Grassland. Sensitive lands are those that are highly dissected, contain highly erodible soils, or contain unstable lands. Geomorphic integrity is defined in terms of the ability

[25] **Erosion** is generally defined as movement or displacement of soil from one site to another. Under most circumstances, only a small portion of eroded soil within a watershed is deposited in a waterway in the form of sediment.

of the watershed to absorb and deliver water effectively to stream channels, the ability of streams to transport water effectively and efficiently and the ability of vegetation to filter sediment and protect stream banks from erosion. Water quality integrity rates the physical, chemical or biological impacts that seriously degrade the resource values (USFS, 1998).

Table 3.34 shows how each subwatershed condition is currently rated. The rating is based on the average condition throughout the watershed. A rating of "1" means high quality or integrity, a rating of "2" means moderate, and a rating of "3" is low. A rating of "2-3" means a primary rating of "2" (moderate integrity/quality) with a secondary rating of "3" (low integrity/quality). This means the majority of the watershed is in moderate overall condition, but minor portions may be in a poorer condition. The rating is based on the degree of certainty of knowledge about the individual watershed and any anomalies and/or inclusions within the watershed (USFS, 1998).

The **vulnerability rating** reflects the inherent risks of conditions becoming degraded if certain sensitive lands in the watershed are disturbed. A rating of "1" means a minor part (less than 20 percent) of the watershed contains sensitive lands. "Sensitive" is defined as having highly erodible soils, areas with highly dissected slopes and/or landslides. A rating of "2" means a moderate portion of the watershed (20-50 percent) is in sensitive lands. A rating of "3" means a major portion of the watershed (greater than 50 percent is in sensitive lands (USFS, 1998).

The **geomorphic rating** reflects soil-hydrologic function - a sponge-and-filter system to absorb and store water- and physical soil-stream resilience. A rating of "1" means indicates the watershed has high soil and water integrity related to its natural potential. Soil-hydrologic function is estimated to be good or excellent throughout the watershed and all streams are estimated to be in dynamic equilibrium relative to potential. It also indicates all riparian areas are in properly functioning condition. A rating of "2" means less than 20 percent of the watershed meets the above criteria. A rating of "3" means more than 20 percent of the watershed does not meet the above criteria (USFS, 1998).

The **water quality rating** reflects overall water quality. Water quality includes stream bank damage, sediment loads, channel modification, flow disruptions, thermal changes, chemical contamination and biological stress. A rating of "1" means no stream segment within the watershed is damaged by physical, chemical or biological impacts such that any resource value appears to be seriously degraded. A rating of "2" means that less than 20 percent of the segment miles is damaged. A rating of "3" means more than 20 percent of the stream resource values appear to be degraded (USFS, 1998).

Table 3.34 displays the summary ratings of watershed condition on the subwatersheds on the Grassland.

Table 3.34. Summary Table of Watershed Condition

Subwatershed	6th field Hydrologic Unit Code (HUC)	Watershed Vulnerability Rating	Watershed Geomorphic Rating	Watershed Water Quality Rating	Overall Watershed Rating
Rock Creek					
	160203091901	2	2-3	2-3	Mod – Low
	160202091902	2	2	2-3	Mod – Low
	160203091903	2	2-3	3	Mod – Low
Deep Creek					
	160203091101	2	2-3	2-3	Mod – Low
	160203091201	2	2-3	2-3	Mod – Low
	160203091202	2	2-3	2-3	Mod – Low
	160203091301	2	2-3	2-3	Mod – Low
	160203091302	2	2-3	2-3	Mod – Low
	160203091303	2	2-3	2-3	Mod – Low
	160203091801	2	2-3	2-3	Mod – Low
	160203091802	2	2-3	2-3	Mod – Low
Buist					
	160203092001	2	2-3	2-3	Mod – Low
SF Rock Creek					
	170402091004	3-2	3		Low
	170402091005	3-2	2-3	3	Low

All of the watersheds, except South Fork Rock Creek have a disturbance vulnerability rating of 2. That is, a moderate part, between 20-50 percent of the watershed, is in sensitive lands. South Fork Rock Creek is rated between 2 and 3 meaning 50 percent or more of the watershed is in sensitive lands.

Geomorphic integrity rated between 2 and 3 for all watersheds within the Grassland. A rating of 2 estimates (a) soil-hydrologic function to be damaged in isolated areas, less than 20 percent of the watershed; (b) less than 20 percent of the stream miles are not in dynamic equilibrium relative to their potential, and (c) less than 20 percent of the riparian miles are "functioning-at-risk" or "nonfunctioning." A rating of 3 estimates (a) soil-hydrologic function to be degraded over more than 20 percent of the watershed; (b) more than 20 percent of the stream miles are not in dynamic equilibrium; and (c) more than 20 percent of riparian miles are "functioning-at-risk" or "non-functioning" (USFS, 1998).

Water quality integrity also rated between 2 and 3 overall. A rating of 2 indicates less than 20 percent of stream segment miles are damaged by physical, chemical or biological impacts, such that any resource value appears to be seriously degraded. A rating of 3 means the same, except it is defined as a major part of the watershed, or greater than 20 percent, is seriously degraded. It should be noted that these ratings were completed on numerous smaller watersheds that make up

the Grassland area. Many of these smaller watersheds have no perennial streams. As a result, water quality was determined to be "not seriously degraded." Major streams within the Grassland appear to have some serious water quality problems and were mostly rated as a 3 (USFS, 1998).

Much of the Grassland area has been seeded with non-native grasses and forbs modifying the hydrology of the uplands somewhat from what native grassland vegetation might have provided. Changes from one plant species to another are not substantial in terms of total cover and infiltration/evapotranspiration[26] influences, except those sites seeded with bulbous bluegrass. Runoff characteristics from these altered uplands, outside of bulbous bluegrass sites, are thought to approximate near-natural characteristics, though no specific runoff studies have been conducted to verify this hypothesis.

Where bulbous bluegrass dominates, ground cover ranges between 50-60 percent increasing the potential of an increase in runoff (USFS, WEPP, 2001). Although these sites may experience higher runoff than native sites, runoff is not nearly as high as disturbed agricultural lands surrounding the Grassland, where the entire soil surface profile has been altered and where fields are left fallow in some years. In these areas, soil infiltration capacities have been reduced and erosion potential has increased. During periodic flash rain events significantly more sediment is delivered to stream channels from plowed fields than from rangelands containing bulbous bluegrass (Kohnke, 1986; Branson, *et al*., 1981).

South Fork Rock Creek riparian area after 1998 flash flood event.

[26] **Evapotranspiration** is the loss of water from the soil both by evaporation and by transpiration from the plants growing on the soil.

Erosion onto the Grassland from private land as a result of flash flood event in 1998.

Rock Creek Subwatershed

This watershed contains four sixth field Hydrologic Unit Code watersheds (HUCs). Rock Creek and Meadow Brook Creek are the two main streams in the watershed. Both are perennial streams. Streamflow information is limited. Base flows have been observed at less than one cubic foot per second (cfs) in both streams. Peak flows can be in the hundreds of cfs following intense, summertime storms or winter rain-on-snow events (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969). Livestock grazing, recreation and farming are the primary uses in the watershed. Livestock grazing is the primary use on the Forest Service administered lands.

The headwaters of the watershed are on private and State owned lands. The stream flows about six miles through the Grassland, then back onto private land then into Deep Creek, about five miles below the Grassland boundary. Most of the privately owned lands are or have been plowed croplands. Some of these croplands have been enrolled in Conservation Reserve Program (CRP), but substantial acreages are still in active croplands. As such, watershed integrity and function have been altered. Plowed lands affect watershed runoff characteristics by influencing infiltration rates, supplying increased sediment to the channel systems, and adding nutrients, dissolved solids and pesticides to runoff water.

Overall watershed condition is considered to be fair to poor, primarily due to the agricultural land within the watershed and, to a lesser degree, the effects of grazing on the uplands and riparian areas.

Deep Creek Subwatershed

This watershed contains eight sixth field Hydrologic Unit Codes (HUCs). Deep Creek, the major stream, flows through the middle of the watershed. North Canyon and Sweeten Pond lie within this watershed. Deep Creek's headwaters begin on privately owned, State and BLM administered lands. The headwaters begin about eight miles above the Grassland boundary. The stream channel crosses approximately five miles of mixed private land and the Grassland, and then it moves back onto private lands for about four miles before crossing into the Grassland boundary again.

About 25 percent of the land within the Grassland boundary is privately owned. Private land and Bureau of Land Management administered land outside the boundary make up the majority of the overall watershed. Most of the private land has been plowed cropland at one time, although a portion of these lands are currently enrolled in the Conservation Reserve Program. Livestock grazing is the major activity on the BLM administered land.

Deep Creek has been dammed for irrigation water storage in Stone Reservoir. Stone Reservoir is also used for recreation purposes and contains a stocked fisheries of both warm and cold water fish species. Large carp have been observed in the backwater and plunge pools above and below the culvert at the County road below the Reservoir. Holbrook Spring, flowing 20-30 cfs, exists about 1 mile above the reservoir's backwater zone. An irrigation diversion has been constructed just below the spring. Most of the flow is diverted during the irrigation season. Less than 10 percent reaches Stone Reservoir during much of the growing season. Above the spring, the channel is mostly ephemeral, flowing less than 50 percent of the time. Below the reservoir, the channel crosses into private land. Any water reaches the reservoir is used for irrigation purposes. Deep Creek dries up shortly after crossing the Utah state line. Surface water seldom reaches the Great Salt Lake, except during extreme flood events (USGS, 1970; Utah DNR, 1974; USGS, 1982; Utah DNR, 1969; Leffert, personal observations, 1990-2001).

North Canyon is a perennial flowing drainage in the northwestern corner of the Grassland boundary. BLM has fenced out a portion of the stream to exclude livestock and improve riparian conditions. As the channel progresses downstream, perennial water seeps into the subsurface and the drainage becomes intermittent. Sweeten Pond is fed by Coop Spring, with excess water flowing toward Stone Reservoir. Sweeten Pond has a unique history of wildlife and agricultural use. Flow into the pond is less than 1 cfs and is supplemented by a well that pumps water into the ponds during drier periods of the year. Neither North Canyon nor Sweeten Pond is considered a fisheries, although small non-game fish, such as dace and shiners, may be present.

The overall watershed condition is rated as fair to poor, primarily because of agricultural land use and, to a lesser degree, the effects of grazing on the uplands and riparian areas (Leffert, personal observations, 1990-2001; USFS, 2001).

Buist Subwatershed

This watershed contains three sixth field HUC watersheds. Deep Creek flows through the middle of the watershed within the Grassland boundary. Sheep Creek is in the northeastern

portion of the watershed flowing from east to west into Deep Creek. The majority of the overall watershed is outside the Grassland boundary and is privately owned or administered by BLM. Of the twenty or more sections within the Grassland boundary and within the watershed, about eight sections, or approximately 33 percent are privately owned.

Overall watershed condition is fair to poor, primarily due to agricultural croplands and, to a lesser extent, upland grazing. Cropland alters the hydrologic regime by modifying infiltration rates and contributing additional sediment, chemical contaminants and debris to the channels. Watershed conditions on lands administered by the Forest are generally fair to good. Livestock grazing and recreation occur on the Forest Service portion. Overall water quality is modified by silt, pesticide and nutrient runoff contributed primarily from agricultural fields (Leffert, personal observations, 1990-2001; EPA, 1998; USFS, 1998).

South Fork Rock Creek Subwatershed

Two "Rock Creeks" occur within the Grasslands - one flows from north to south into Deep Creek within the Great Basin. The other flows from south to north into the Snake River Basin. This watershed contains the Rock Creek drainage that flows north into the Snake River. Two sixth field watersheds are found within the Grassland boundary. Approximately eight sections and several small parcels are privately owned. Most of the overall watershed consists of private property and BLM administered lands.

Kurtz Spring and North Kurtz Spring are the primary water sources, both of which flow into South Fork Rock Creek. The headwaters begin on private land above the Grassland boundary. Private land is used primarily for agriculture. The stream flows for about two miles through the Grassland, then back onto private land. Both Kurtz and North Kurtz springs flow less than 1 cfs. As in the other watersheds, cropland within and above the Grassland alter storm runoff flows, contribute sediment to the channel system and deliver nutrients, pesticides and debris to the streams. Livestock grazing is the primary use on Forest Service administered land. Grazing impacts on the uplands is moderate overall. No fisheries exist within this watershed within the Grassland boundary.

Overall watershed rating is considered fair to poor. Livestock grazing impacted riparian areas, but private land in active crop production has had a profound impact on the overall condition of the watersheds.

Riparian/Wetland Areas

Issue Statement:	Some stream channels and riparian areas on the Grassland have been degraded and need to be improved to attain riparian properly functioning condition.
Issue Indicator:	Miles of stream at or moving towards a riparian properly functioning condition.

Issue Indicator Baseline: Current miles of stream at or moving towards a riparian properly functioning condition: **10 miles**

Spatial Scales Used for Analysis: Greater Curlew Valley and Curlew National Grassland

Temporal Scale: 45 years

Greater Curlew Valley Area

In 1994, the Bureau of Land Management assessed several stream channels and riparian areas they administer within the Curlew Valley for functioning condition, using a process developed by the agency (BLM, 1994). Sheep Creek, Meadow Brook, North Canyon and Wood Canyon were evaluated. Sheep Creek was found to be functioning in the upper reaches and nonfunctioning in the lower reaches. Meadow Brook Creek was found to be functioning-at-risk. North Canyon was found to be functioning-at-risk. Five reaches on Wood Canyon were found to be properly functioning to functioning-at-risk (USDI-BLM, 1998).

Curlew National Grassland

The major perennial channels within the Grassland have been assessed for Properly Functioning Condition, using a process developed by the Bureau of Land Management and adopted by the Forest Service (BLM, 1994). This assessment process differs somewhat from the process used by the BLM (USDI-BLM, 1998). The BLM/FS evaluation process appraises the physical functioning of the stream system by evaluating three major parameters: soils, vegetation and hydrology - and their departure from a "normal" condition. Over 20 channel reaches within the Grassland have been evaluated using this method. Several reaches have been determined to be in properly functioning condition, or are considered to be functioning properly, but at risk of degradation from a variety of factors, including roads, downstream headcutting, livestock grazing and upstream agricultural activities. Many reaches have been rated as nonfunctioning; that is the combination of soil, vegetation and hydrology factors place the channels below what would be considered an acceptable condition to adequately carry flood flows, provide for riparian vegetation, provide suitable aquatic habitat, and maintain stream channel stability. (USFS, 1998).

Riparian Properly Functioning Condition Assessments

Approximately twenty-four miles of stream channels with associated riparian areas occur on the Grassland. In 1998 the Forest Service evaluated all the major streams within the area for Properly Functioning Condition. (USFS, 1998)

Rock Creek, Salyer Creek, Sheep Creek, North Canyon, Deep Creek and Meadow Brook Creek have been evaluated for properly functioning condition. Twelve reaches were evaluated on Rock Creek, eleven on the main stem and one on a primary tributary. Two reaches were at Properly Functioning Condition, four reaches were Functioning-at-Risk, and five reaches were Nonfunctioning. The primary deficiencies include downcutting and the lack of deep-rooted

riparian vegetation. Livestock impacts were obvious along several of the reaches. The tributary reach, Rock Spring, was rated as nonfunctioning; however, this rating is somewhat misleading. A torrential thunderstorm and flood scoured the stream in 1998 (Leffert, personal observations, 1998). Livestock grazing may have exacerbated the damage to the stream channel and riparian area, but damage would have occurred with or without the presence of livestock grazing. Peak flows were estimated in the hundreds of cubic feet per second (cfs). High water marks were observed 10 to 15 feet above the channel bottom. This kind of event is not uncommon in the Curlew valley area. Flows were recorded near 1,000 cfs in 1962 (Utah DNR, 1969 and 1974). Despite these reoccurring catastrophic events, willows are naturally regenerating, and sedges, watercress and brook grass are reinvading the stream banks in some locations.

Five reaches were evaluated on Meadow Brook Creek. One reach was at Properly Functioning Condition, and four reaches were functioning-at-risk. One reach, not formally evaluated, contained a four to five foot headcut and was nonfunctioning. Since the assessment was made, the head cut has been stabilized. Livestock impacts were visible, but not to the extent that would rate the channel nonfunctioning. The headcut that had begun working its way up a meadow was one of the reasons the channel was rated down to an overall value of functioning-at-risk. The channel above the headcut is functioning properly, but at- risk if the headcut continues to progress upstream.

Salyer Creek had one reach rated at Properly Functioning Condition.

Channels in the Deep Creek subwatershed have been rated as nonfunctioning to functioning-at-risk. North Canyon reaches are deeply downcut and are rated nonfunctioning to functioning-at-risk. Little water flows downstream of Sweeten Pond and Coop Spring. Stone Reservoir contains fair to poor quality water, and the reservoir is visibly filling with sediment. No estimates of silt content have been made but a sediment delta exists for over a mile at the head of the reservoir. A reach of .5 miles above the reservoir was rated as functioning-at-risk. Uplands within the Grassland boundary have been moderately grazed by livestock. Hydrologic characteristics of these uplands are considered to be acceptable. Soils have been somewhat modified by livestock trampling, but ground cover and runoff characteristics are probably within the historical range of variability, even though introduced grass and forbs species have replaced some of the native species.

Deep Creek is deeply downcut in some locations and is considered functioning-at-risk to nonfunctioning. Deep Creek does not support a fisheries, although minor populations of warm-water dace and shiners may be present in the stream.

Three reaches of Sheep Creek were evaluated. Two reaches on BLM land were evaluated in 1994 and one on the Grassland in 2000. Upper Sheep Creek was evaluated by the BLM and rated as properly functioning. Lower Sheep Creek was rated by the BLM as nonfunctioning. The portion of Sheep Creek within the Grassland has been rated by the Forest Service as being functioning-at-risk with an upward trend. The installation of riparian pastures, reducing access to the stream channel, has helped to improve overall conditions within the Grassland reach.

Three reaches of South Fork Rock Creek were evaluated and all were rated as nonfunctioning. Down-cutting and lack of deep-rooted riparian vegetation were the primary reasons for the rating. Cultivated fields upstream have had a profound effect on the channel. These fields have altered runoff characteristics and have contributed sediment and debris to the channel. Livestock use is visible and contributing to channel instability in some reaches; however, a riparian pasture has since been installed along the Grassland portion of the stream to reduce livestock impacts. South Fork of Rock Creek has been evaluated by the State of Idaho as containing water that does not meet state water quality standards for designated beneficial uses. The identified pollutant is sediment.

Several small wetlands occur within the Grassland and are associated with small seeps and springs. These areas have been generally accessible to livestock and have been impacted by them. An exception is the wetland area below Sweeten Pond. Livestock have been excluded from this area, and it is considered to be in good overall condition. Sedges and other wetland species exhibit high vigor and have a good age-class distribution.

In 1997, the Idaho Wildlife Federation surveyed five streams within and adjacent to the Grassland for Properly Functioning Condition (Wildlife Federation, 1997). Of eleven reaches surveyed on Rock Creek, the Federation concluded that two reaches were in Properly Functioning Condition, three were functioning-at-risk, and six were nonfunctioning. Of five reaches surveyed on Meadow Brook Creek, one reach was rated in Properly Functioning Condition, three reaches were rated functioning-at-risk, and one reach was rated nonfunctioning. All surveyed reaches of South Fork Rock Creek and Rock Spring Creek were rated nonfunctioning. Salyer Creek was rated in properly functioning condition. These findings are similar to the Forest Service assessment of stream conditions within and adjacent to the Grassland.

Table 3.35 summarizes various Riparian Properly Functioning Condition Assessments completed by the Forest Service, the BLM, and the Idaho Wildlife Federation

Table 3.35. Summary Table of Riparian Properly Functioning Condition Assessment on the Forest Service Portion of the Curlew National Grassland

Reach Name	Length (Miles)	IWF Rating	USFS Rating	BLM Rating
Rock Creek 1	0.2	Non-functional	Functioning at Risk Upward trend	Not evaluated
Rock Creek 2	0.3	Non-functioning	Non-functioning	Not evaluated
Rock Creek 3	0.12	Functioning at Risk Upward trend	Functioning at Risk Upward trend	Not evaluated
Rock Creek 4	0.16	Non-functioning	Non-functioning	Not evaluated
Rock Creek 5	0.48	Properly functioning	Functioning at Risk Upward trend	Not evaluated
Rock Creek 6	0.2	Non-functioning	Non-functioning	Not evaluated
Rock Creek 7	0.2	Functioning at Risk Upward trend	Functioning at Risk Upward trend	Not evaluated
Rock Creek 8	0.92	Non-functioning	Non-functioning	Not evaluated
Rock Creek 9	1.16	Properly functioning	Properly functioning	Not evaluated
Rock Creek 10	0.15	Non-functioning	Non-functioning	Not evaluated
Rock Creek 11	2.1	Functioning at Risk Upward trend	Functioning at Risk Upward trend	Not evaluated
Meadow Brook 1	1.35	Non-functioning	Functioning at Risk Upward trend	Not evaluated
Meadow Brook 2	0.5	Properly functioning	Properly functioning	Not evaluated
Meadow Brook 3	0.3	Functioning at Risk No apparent trend	Functioning at Risk No apparent trend	Not evaluated
Meadow Brook 4	0.13	Functioning at Risk No apparent trend	Functioning at Risk Upward trend	Not evaluated
Meadow Brook 5	Private land	Functioning at Risk Upward trend	Functioning at Risk Upward trend	Not evaluated
SF Rock Creek 1	2.85	Non-functioning	Non-functioning	Not evaluated
SF Rock Creek 2	0.62	Non-functioning	Non-functioning	Not evaluated
SF Rock Creek 3	0.65	Non-functioning	Non-functioning	Not evaluated
Rock Springs Creek 1	1.36	Non-functioning	Non-functioning	Not evaluated
Salyer Spring	0.78	Properly functioning	Properly functioning	Not evaluated
Upper Sheep Creek	0.2	Not evaluated	Not evaluated	Functioning at Risk No apparent trend
Sheep Creek	0.5	Not evaluated	Not evaluated	Functioning at Risk No apparent trend
Lower Sheep Creek	0.25	Not evaluated	Functioning at Risk Upward trend	Not evaluated
Deep Creek Above Stone Reservoir	0.5	Not evaluated	Not evaluated	Not evaluated
North Canyon	0.9	Not evaluated	Not evaluated	Non-functioning
North Canyon	0.25	Not evaluated	Functioning at Risk Upward trend	Not evaluated
Wood Canyon	2.8	Not evaluated	Not evaluated	Functioning at Risk No apparent trend

Table 3.36. Summary of USFS/BLM Riparian PFC Evaluations

Subwatershed	Stream Name	No. of PFC reaches (miles)	No. of Functioning at Risk reaches (miles)	No. of Nonfunctioning reaches (miles)
Rock Creek	Rock Creek	1 (1.16)	5 (3.1)	5 (1.73)
	Meadow Brook	1 (0.5)	4 (1.78)	0
	Salyor	1 (0.78)	0	0
Deep Creek	Deep Creek	0	1 (0.25)	0
	North Canyon	0	2 (1.15)	0
	Wood Canyon	0	1 (2.8)	0
Buist	Deep Creek	0	1 (0.25)	0
	Sheep Creek	1 (0.2)	2 (0.25)	1 (0.5)
SF Rock Creek	SF Rock Creek	0	0	3 (4.12)
	Rock Spring Creek	0	0	1 (1.36)
TOTAL		**4 (2.64)**	**15 (9.58)**	**10 (7.21)**

Issue 2 – Vegetation Management/Wildlife Habitat

Sagebrush Canopy Cover

Issue Statement: Some people feel sagebrush should be managed for less than 15 percent canopy cover to maintain/increase forage production and biodiversity. Others advocate sagebrush should be managed for greater than 15 percent canopy cover to meet sage grouse nesting and wintering habitat needs. Still others say sagebrush should be managed for structure and composition to achieve properly functioning condition in this vegetation cover type.

Issue Indicator: Percent of Curlew National Grassland acres in:

0-5% sagebrush canopy cover
6-15% sagebrush canopy cover
>15% sagebrush canopy cover

Baseline Indicator: Current percent of Grassland acres in:

0-5% sagebrush canopy cover: **17% of acres**
6-15% sagebrush canopy cover: **24% of acres**
>15% sagebrush canopy cover: **59% of acres**

Spatial Scales Used for Analysis: Greater Curlew Valley and Curlew National Grassland

Temporal Scale: 45 Years

At least six sagebrush species and subspecies and associated herbaceous understory species are present in the Greater Curlew Valley. Sagebrush is the dominant vegetation cover type

occupying 90-95 percent of the Grassland. Approximately 17 percent of the area occupied by sagebrush is in 0-5 percent canopy cover; 24 percent is in 6-15 percent canopy cover; and 40 percent is in 16-24 percent canopy cover; and 19 percent is greater than 25 percent canopy cover (USFS, 1998).

Sagebrush canopy cover density is important to many aspects of Grassland management. For some upland game bird species, it is important for breeding, nesting and brood-rearing habitat. For ecosystem properly functioning condition, it is important to maintain a balanced range of sagebrush canopy cover densities. Density of sagebrush may also have an affect on production of the herbaceous understory, which may affect livestock use, forage production and availability.

Sagebrush canopy density has a direct relationship to herbaceous understory production and seedling recruitment. As sagebrush becomes established in dense stands, production and reestablishment of grasses and forbs are reduced. The reasons for this reduction may be related to a variety of factors, mainly competition for light, water, nutrients and space. The literature suggests that when big sagebrush canopy density is reduced, an increase in herbaceous production occurs (Blaisdell, *et al*., 1982; Britton and Ralphs, 1978). Winward found that when canopy cover on mountain and big sagebrush sites approach 30 to 40 percent, herbaceous production is restricted, and these sites are essentially closed to recruitment of new herbaceous seedlings. As herbaceous species in the understory decline, the fine-fuel component necessary to carry fire into the sagebrush canopy is lost (Winward, 1991).

Past and current fire suppression activities have allowed succession in the big sagebrush vegetation communities to trend toward more dense canopy cover (greater than 15%) on a majority (59%) of the Grassland. The rate of recovery is highly variable after lethal fire for mountain and basin big sagebrush stands to achieve pre-burn conditions. The rate of recovery is largely dependant on grazing practices and undefined weather variables that favor sagebrush seedling survival and establishment (Harniss and Murray, 1973). The time it takes to achieve pre-burn canopy cover densities is arguable. The literature suggests the rate of recovery ranges from as little as fifteen years to more than thirty years to achieve pre-burn sagebrush canopy conditions (Bunting, *et al.*, 1987; Frass, *et al*., 1992; Harniss and Murray, 1973; Bushey, 1986; and Walhof, 1997). On the Grassland, specific treated sites have been measured and appear to recover within twenty to forty years (Field Notes Report, 2001). Sagebrush-grass ecosystems evolved with a natural fire return interval of twenty to forty years (Blaisdell, *et al*., 1982; Barrett, 1994; Houston, 1971; Gruell, 1985; Williams, 1995). The loss of the understory component and fire suppression efforts have caused stagnant conditions on many sagebrush sites where natural fire regimes have been altered (Winward, 1991).

The Draft Properly Functioning Condition (PFC) Rapid Assessment Process completed September 8,1997 suggested that to attain a properly functioning sagebrush ecosystem, a balanced range of sagebrush structure and composition should consist of 10 percent of the sagebrush acres in 0-5 percent canopy cover, 50 percent of the acres in 6-15 percent canopy cover, and 40 percent of the acres in greater than 15 percent canopy cover.

Table 3.37 shows sagebrush canopy cover classes found on the Grassland compared to what has been estimated for a Properly Functioning Condition in the sagebrush type.

Table 3.37. Comparison of PFC Needs with the Current Conditions on the CNG

Sagebrush Canopy Requirements	Percent of Area to meet PFC	Acres Needed to meet PFC	Existing Percent of Acres on Grassland	Acres Existing on CNG	Percent Difference between PFC and existing
0-5%	10%	4,515	17%	7,675	+7%
6-15%	50%	22,575	24%	10,836	-26%
>15%[1]	40%	18,060	59%	26,639	+19%
TOTAL	**100%**	**45,150**	**100%**	**45,150**	

1 Prevedel's analysis separated sagebrush canopy cover into 16-24% and greater than 25%. To simplify the display with Properly Functioning Condition classes, these two classes have been combined on this table into one class of greater than15% canopy cover.

Mountain Brush Management

Issue Statement: Some people feel mountain brush communities, including serviceberry and bitterbrush, should be preserved or maintained at current densities and conditions for nesting upland species and big game. Others say these communities should be managed in a healthy matrix (multiple ages and structures) with whatever tools are appropriate.

Issue Indicator: Percent of mountain brush communities in early and mid/late age classes.

Baseline Indicator: Current percent of mountain brush communities in early seral: **0%**

Current percent of mountain brush communities in mid/late seral: **100%**

Spatial Scales Used for Analysis: Greater Curlew Valley and Curlew National Grassland

Temporal Scale: 45 Years

Between 5-10 percent of the Greater Curlew Valley Area is occupied by mountain brush. Mountain brush is important for diversity and provides unique habitat for wildlife, because of its relatively small extent within the valley. Only about 1,360 acres, or about 3 percent, of the Grassland is occupied by mountain brush. This type is generally found on north and south slopes.

The mountain brush community is comprised of multiple vegetation layers and appears to be in older age classes, based on shrub size and number of dead branches in the shrub canopy.

Composition is balanced with alternating shrub/herbaceous components. Historical fire return intervals are beyond the natural twenty- to forty-year return cycle.

Mountain brush cover on mountain brush acres on the Grassland is estimated at approximately 23 percent, including about 7 percent in sagebrush (Collins, *et al.*, 1982). A variety of native forbs are present. These shrub species (except sagebrush) resprout after fire and occur in areas receiving fourteen to sixteen inches of annual precipitation.

On the Grassland, mountain brush sites appear to have escaped the plow because they are generally located on rocky, steep slopes not suitable for cultivation. Patterns appear to be within historical ranges of acres and distribution; however, shrubs are showing over-maturity with many dead branches occurring on some sites. Reproduction of the shrub layer is not occurring. Fire suppression has increased the disturbance interval to fewer and larger fires that are outside the twenty to forty-year fire return interval. As a result, mountain brush sites have a high degree of departure from historical fire regimes.

Vegetation Understory Composition

This issue has been separated into two parts: Part A refers to acres of bulbous bluegrass treated and Part B refers to reseeding treatment areas with native species.

Issue Statement Part A: Bulbous bluegrass (*Poa Bulbosa*) is a sod-forming species which provides for watershed stability; however, bulbous bluegrass has low value for wildlife habitat and livestock forage.

Issue Indicator Part A: Acres of bulbous bluegrass treated to improve understory composition.

Baseline Indicator Part A: Existing acres of bulbous bluegrass: **5,200 acres**

Spatial Scales Used for Analysis: Grassland Only

Temporal Scale: 45 Years

Records from 1950's (Handy, 1950) indicate about 8,500 acres were planted to seed mixtures that included bulbous bluegrass (*Poa bulbosa*). This species has become dominant where it was seeded and forms pure monocultures in some areas. In 1990, about 2,200 acres were treated to eliminate bulbous bluegrass and reseeded to introduced forage species of crested wheatgrass, intermediate wheatgrass, alfalfa, sainfoin and small burnett. In 1999, a 1,000-acre bulbous bluegrass treatment was initiated on the North Carter field. The treatment site will be seeded in 2001 or 2002 to a mixture of introduced grass species, native forbs and sagebrush (See Decision Notice and FONSI for South Hess Haws and North Carter Fields Rehabilitation, Curlew National Grassland Environmental Assessment, September 1998). Table 3.38 displays the location and number of acres of bulbous bluegrass remaining on the Grassland.

Table 3.38. Acres of Remaining Bulbous Bluegrass by Field

Field Name	Total Acres in field	Acres of bulbous bluegrass remaining
West Hurd (C)	608	574
South 13 (C)	1,306	650
South Hess-Haws (B)	720	720
East Hess B (B)	808	600
East Hess A (B)	514	350
Sheep Creek (B)	664	230
South Funk (C)	1,998	693
East Hunsaker (B)	645	480
East Grandine (C)	516	120
West Richards (B)	537	75
East Jacobsen (C)	1,108	640
TOTAL	**9,424**	**5,132**

Data generated from FS GIS database
(B) = Buist Fields
(C) = Curlew Fields

Historically, treatments of bulbous bluegrass on the Grassland have been reseeded with non-natives for vegetation establishment and to benefit livestock.

Issue Statement Part B: Some people feel that treatment areas should be reseeded with native grasses, forbs, and shrubs (primarily sagebrush) to benefit wildlife rather than the historical practice of using primarily crested wheatgrass.

Issue Indicator Part B: Number of acres reseeded or interseeded using native species, including sagebrush as part or all of the seed mix.

Baseline Indicator Part B: Number of areas reseeded or interseeded using native species, including sagebrush, as part or all of the mix: **1,080 acres**

Spatial Scales Used for Analysis: Curlew National Grassland

Temporal Scale: 45 Years

Early seeding records indicate that a total of about 35,500 acres were seeded to mixes that included crested wheatgrass (2230 Files, Malad Office, Westside Ranger District). About 8,500 acres were dominated by bulbous bluegrass, with the remaining 28,000 acres dominated by crested wheatgrass. Most of the seedings are thirty to forty years old and are now managed for brush control using prescribed fire or herbicides when brush canopy cover reaches 20-25 percent.

Based on past bulbous bluegrass treatment methods - burning, plowing, laying fallow for one year, and reseeding with a desirable seed mix, some suggest a similar treatment would be necessary to eliminate crested wheatgrass. Treatments would probably take from three to five years before treated sites could be restored to some level of production.

Wildlife Habitat Management

The Wildlife Habitat issue has several important and related components. The components have been separated into six distinct issues that are closely related to wildlife habitat. Part A refers to the size of sagebrush treatment areas and the effect on fragmentation and connectivity of sagebrush habitat. Part B refers to the level of livestock use and the effect on wildlife habitat. Part C refers to the use of prescribed fire in sage grouse habitat. Part D refers to viability of native and desired non-native wildlife populations. Part E refers to tree rows and their value as wildlife habitat.

Issue Statement Part A: Sagebrush in the Curlew Valley has been converted to other uses resulting in habitat fragmentation and reduced connectivity for sagebrush dependent and associated wildlife species. The size and location of future vegetation treatments within the Grassland have the potential to further affect connectivity and fragmentation. Some commenters advocate that sagebrush treatments should be "small scale" (less than 20 acres) to reduce impacts to wildlife species, including the sage grouse, and promote reestablishment of sagebrush. Historically, sagebrush treatments have been on the scale of hundreds of acres or by field for efficiency.

Issue Indicator Part A: Percent of sagebrush acres in potential sage grouse nesting habitat (16-24 percent sagebrush canopy cover) at end of first decade.

Baseline Indicator Part A: Current percent of sagebrush acres in potential nesting habitat (16-24% sagebrush canopy cover**): 42%**

Spatial Scales Used for Analysis: Greater Curlew Valley and Curlew National Grassland

Temporal Scale: 45 Years

Discussion

A variety of sagebrush treatment methods have been used on the Grassland in the past. Railing, chaining, roto-beating, chemicals, plowing and burning have been used to treat sagebrush. The size of each treatment has varied from as small as 120 acres to as large as 2,500 acres, with the average size of treatment around 1,000 acres.

Historical patch sizes were not estimated for the Vegetation Properly Functioning Condition analysis for the Grassland, because lands had been greatly modified at the time of acquisition. While fire frequency has been estimated in several studies, very little information is available on patch size as a result of wildfire. Knick and Rotenberry (1995) completed an analysis of the sage

sparrow, a sagebrush obligate. The probability of species occurrence increased with sagebrush canopy cover and patch size. For this analysis, it was assumed that 320 acres is the minimum patch size needed for sagebrush dependent, area-sensitive species (Paide and Ritter, 1999).

Larger species, such as sage grouse, need much larger areas of adequately connected habitat to maintain populations (Paige and Ritter, 1999). Maintenance of a mosaic of open to moderate shrub densities of 5 percent to 20 percent with multiple age and height is desired. Canopy cover is one important consideration, particularly its relationship to the evolution of associated wildlife species. Sage grouse depend on sagebrush canopy cover for survival. "Adequate" sage grouse nesting and brood-rearing habitat is characterized as having a 16-25 percent canopy cover. Winter habitat also requires this amount of sagebrush coverage but it must be exposed above the snow so it can be used for food.

A patch size analysis was completed for each alternative as a way to compare alternatives. Due to the intermingled land ownership patterns, it is difficult to assess fragmentation on the Grassland. Because the exact size and locations of treatments will be determined later at the site-specific level, this analysis made rough estimates of project locations, based on canopy covers treated in the alternative, and the lek buffer that was applied in the alternative. This analysis did not include the effects of succession. As a result the analysis underestimates what would actually occur at the end of the decade. In order to reflect changes in important sage grouse nesting habitat the percent of sagebrush acres in 16-24 percent canopy cover was also used to show how treatments proposed in each alternative would affect this sagebrush canopy cover class.

Issue Statement Part B:	Some commenters contend that the current livestock use level (~60 percent) provides sufficient forage for the current stocking levels and sage grouse and sharp-tailed grouse nesting habitat. Others contend the use level is too high and should be reduced to provide higher quality sage and sharp-tailed grouse habitat.
Issue Indicator Part B:	Whether the alternative "meets," "partially meets" or "does not meet" the Idaho State Sage Grouse Management Plan (1997 or most current version).
Baseline Indicator Part B:	**Defined by each alternative**
Spatial Scales Used for Analysis:	Grassland only
Temporal Scale:	45 Years

Current forage production calculations estimate the Grassland produces between 38 and 44 million pounds of forage per year (See Table 3.32). Based on these estimates and the current 60 percent livestock utilization rate, a range of from 19,600 to 27,900 livestock head months could be supported on the Grassland. The remaining 40 percent, or about 15 millions pounds of forage, is available to meet other resource objectives throughout the year. No studies are

available that correlate utilization levels with residual vegetation stubble height at this time (ID Team Field notes, 2001). Correlating livestock utilization levels with residual vegetation needed to meet wildlife needs has been identified as a research need through this planning process. The season of grazing also affects grass height in the spring. If grazing early in the year occurs before allowing regrowth, more cover will be provided during the resting period.

Issue Statement Part C:	Prescribed fire is currently used to meet a variety of resource objectives. Some commentors contend that the use of prescribed fire is inappropriate for sage grouse habitat management. Others contend prescribed fire is the preferred tool to meet resource objectives.
Issue Indicator Part C:	Number of acres in greater than 15 percent canopy cover treated using prescribed fire.
Baseline Indicator Part C:	The No Action alternative would treat **18,750 acres**
Spatial Scales Used for Analysis:	Grassland only, Greater Curlew Valley for Cumulative Effects
Temporal Scale:	45 Years

Prescribed fires and wildfires typically remove most of the existing sagebrush, creating early-seral conditions (0-5%. canopy cover). Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana* var. *pauciflora*) do not sprout following fire, but readily reestablish from seed stored in the soil and from seed transported by the wind from nearby sources. Depending on climatic conditions and grazing patterns, it takes approximately ten years for the canopy density of basin big sagebrush and of mountain big sagebrush to reach 6-15 percent (mid-seral conditions), and approximately twenty years for the canopy density cover to reach greater than 15 percent (late-seral conditions) following a disturbance by fire (ID Team Field Notes, 2001).

The Properly Functioning Condition (PFC) assessment found sagebrush communities on the Grassland exhibit a high degree of departure from historic conditions due to fire suppression (Caribou National Forest 1998). The PFC assessment determined that these sagebrush communities are "functioning-at-risk," with too few acres in the mid-seral stage and too many acres in the late-seral stage. Livestock grazing and fire suppression have created a landscape that displays large areas of sagebrush that are older and have denser canopies than if they had developed under the influence of an historic fire regime. When dominant big sagebrush reach a canopy density greater than 15 percent, they begin to compete aggressively with the understory, putting the ecosystem at risk of losing the grasses and forbs that sage grouse depend upon at various stages in their life history.

Prescribed fire is a useful tool for reducing the amount of late-seral sagebrush. Prescribed fire converts late-seral sagebrush to early-seral conditions. It is highly unlikely that prescribed fire

could be used to create mid-seral sagebrush communities. Other treatments, such as herbicide applications or brush beating, would be more appropriate.

Issue Statement Part D:	Grassland management may affect native and desired non-native wildlife population viability
Issue Indicator Part D:	**Viability analysis protocol for the selected alternative**
Baseline Indicator Part D:	For riparian and sagebrush associates, viability analyses focuses on changes in habitats as a result of each alternative. For sage grouse, it is assumed that those alternatives best meeting Connelly, *et al*, Sage Grouse Guidelines will contribute to sage grouse viability.
Spatial Scales Used for Analysis:	Greater Curlew Valley and Curlew National Grassland.
Temporal Scale:	45 Years.

Viability analyses incorporate four levels. The first level, bioregional assessments, assesses ecological sustainability. The Grassland has not been included in any of the bioregional assessments. A Vegetation Properly Functioning Condition Assessment has been completed for the Grassland. The second level uses a coarse-filter approach to describe ecological conditions needed to maintain or restore viability for the majority of native species and communities. Shrub riparian and sagebrush-associated management indicator species and species-at-risk were analyzed using this approach. The third level uses a fine-filter approach for species that are not adequately addressed at the coarse-filter level (e.g. species that may have more specific habitat needs, such as threatened, endangered and sensitive species). In this analysis, sage grouse are addressed at the fine-filter level. The fourth level uses monitoring, which is essential to maintain viable populations and species (USFS, 1999).

Viability analysis for fine-filter species (threatened, endangered and sensitive species and species-at-risk) includes several steps; (1) identify species at risk, (2) identify life history traits for these species, (3) identify risk factors facing these species, (4) group species based on habitat needs, common risk factors etc (5) develop conservation measures, (6) integrate into alternatives and (7) effects analyses.

Connelly, *et al.*, 2000), has developed a set of draft guidelines for the management of sage grouse populations and habitats. These guidelines were developed to maximize sage grouse habitat. Although the guidelines contain a comprehensive set of recommendations, the following discussion compares only four of the guidelines with how well management direction in the alternative meets the guideline. The four guidelines were selected because they best represent sage grouse habitat requirements, including breeding habitat, which includes lek attendance, nesting, early brood-rearing, and winter habitat (Connelly, *et al.*, 2000), and more closely relate to public issues received during the scoping period. The selected guidelines incorporate sagebrush canopy cover and residual grasses, which provide cover for nesting, and forbs

understory, which is important in the spring diet of adults and broods. It is assumed that those alternatives that best meet the Guidelines will contribute to viable sage grouse populations over the GCVA in the short-term.

Issue Statement Part E: Some people feel that tree rows harbor sage grouse predators while others contend that tree rows provide values, including wildlife habitat.

Issue Indicator Part E: Miles of tree rows on the Grassland at the end of the first decade.

Baseline Indicator Part E: Current miles of tree rows on the Grassland: **21 miles**

Spatial Scales Used for Analysis: Greater Curlew Valley and Curlew National Grassland.

Temporal Scale: 45 Years

Tree rows are generally situated along the boundary between the Grassland and private land and fenced to exclude livestock grazing. Approximately thirty-five miles of tree rows have been planted on the Grassland beginning in the 1940's, but only twenty-one miles have persisted through time. Tree rows are about 100 feet wide and composed of a variety of native and introduced shrub species. Russian olive and Siberian pea shrub are the only planted species that have established. Most tree rows have reestablished with native sagebrush cover. The herbaceous understory is predominantly crested wheatgrass.

Wildlife food, cover and habitat diversity are emphasized in these areas. In addition to upland game birds, tree rows provide habitat for cottontail rabbits, mourning doves, magpies, ravens, neotropical migratory land birds and raptors. Recent concerns suggest tree rows provide nesting and perch habitat for magpies and ravens, the suspected predators of sage grouse nests.

Economic and Social Values

Issue Statement: Changes in Grassland management may have social and economic effects such as impacts on jobs income, and county revenues.

Issue Indicators: Changes in job opportunities within Oneida County
Changes in income opportunities within Oneida County
Estimated Federal payments from the Grassland by alternative

Baseline Measures: Number of jobs in 1998: **1,770** (Table 3.39)
Personal income in 1998: **$33,478,000** (Table 3.39)
Federal Payments to Oneida County 5-year average payment: **$197,955** (Table 3.40)

Spatial Scales Used for Analysis: Oneida County

Temporal Scale: 10 years

Table 3.39. Baseline employment and income by sector in Oneida County: 1998

Employment Sector	Employment Number of Jobs	Employment Percent of Total	Income Millions of Dollars	Income Percent of Total
A.F.F	550	31	9.778	29
Mining	56	3	2.770	8
Construction	75	4	1.780	5
Manufacturing	46	3	1.099	3
T.P.C.U	23	1	0.889	3
Wholesale Trade	35	2	0.584	2
Retail Trade	230	13	1.808	5
F.I.R.E	73	4	1.558	5
Services	251	14	3.725	11
Government	431	24	9.490	28
TOTAL	**1,770**	**100**	**33.478**	**100**

Source: MIG 2001.

Federal payments made to Oneida County for 1994 through 1999 are displayed in the Table 3.40 with the last five-year average for comparison.

Table 3.40. Federal payments to Oneida County, 1994 - 2001

Fiscal Year	PILT Payment	25 percent fund	Bankhead-Jones
	Federal [1]	Forest Service [2]	Grassland[3]
	Dollars		
1995	154,508	13,148	5,763
1996	170,384	18,097	4,240
1997	180,569	19,075	684
1998	188,115	19,743	3,107
1999	193,290	17,487	1,566
5-year average	177,373	17,510	3,072

[1]Figure shown is payment from all federal lands within Oneida County.
[2]Figure shown is payment from Caribou and Sawtooth National Forests.
[3]Figure shown is payment related to Grassland receipts.

PILT payment is based on acreages within the county and does not change significantly over the years; it guarantees a minimum payment to the county. The 25 percent fund payments are based on receipts paid for resource uses, such as grazing on Sawtooth and Caribou National Forest system lands. Bankhead-Jones payments are based on grazing receipts received by the Curlew National Grassland.

Issue Statement: The cost of maintaining head-months on the Grassland should be justified by monetary benefits gained from providing head-months.

Issue Indicator: Financial Efficiency Analysis for Costs and Revenues by alternative.

Estimated Annual Grazing Program Costs, Revenues and Benefits by alternative.

Baseline Measurement: Efficiency Analysis Results for Existing Condition: **-5.475**
Estimated Annual Grazing Costs for Existing Condition: **$207,992**
Estimated Annual Value for Grazing for Existing Condition: **$125,616**

Spatial Scales Used for Analysis: Curlew National Grassland

Temporal Scale: 10 years

People are interested in how the dollar cost of the alternatives compare with anticipated dollar receipts. The Grassland has the potential to produce forage sufficient to support approximately 22,639 head months at a 60 percent forage utilization level. The average permitted head month numbers is about 20,035 with the average authorized use is lower at about 19,500 head months annually. Permittees pay the government $1.35 per head month for forage consumed on the Grassland, the market value of a head month is estimated at $6.27. At a $1.35 per head month, the 19,500 head months utilized in 2001 contributed $26,352 in direct receipts to the government, and about $6,500 in county revenues through the 25 percent fund. Total market value of the head months utilized in 2001 is estimated at $122,265. Market value is an estimate of what permittees would have paid for similar grazing opportunities on private land.

The current direct cost to the government of administering the grazing program on the 150,000 acres in allotments on the south end of the Westside Ranger District has been about $63,000 per year, or about $0.42 per acre per year over three years (personal communication with Ken Timothy, 1998). Based on this information the direct cost of administering grazing on the 47,600-acre Grassland is estimated to be about $20,000 per year.

In addition to the direct costs of administration, the Forest Service has the authority to waive up to 50 percent of grazing receipts back to the permittee for range improvements. These monies are called CP funds (Conservation Practices funds), and in reality, they are attributable to the overall costs of managing the Grassland. An additional $13,163, or 50 percent of actual annual average receipts, is considered a direct cost of managing the Grassland. When combined with the administration costs, the total cost of the grazing program is approximately $33,163. On the other side, these CP funds are a benefit to permittees and are used for range improvement projects. From an economic standpoint, the benefits associated with the grazing program are considerably higher than the receipts paid to the government. Fair market value for grazing is currently estimated at $6.27 per AUM (Washington Office letter, dated 1/29/98, Subject: FY 1998 Animal Unit Value Coefficients.)

Issue Statement: The cost of bulbous bluegrass treatments should be justified by the monetary benefit.

Issue Indicator: Economic Efficiency analysis (Present Net Value) by alternative

Baseline Measures: Present Net Value for Existing Condition: **14.230**

Spatial Scales Used for Analysis: Curlew National Grassland

Temporal Scale: 10 years

The cost of treating bulbous bluegrass includes the cost of burning, plowing and reseeding the project area. Allowing a contractor to plant and harvest a crop of grain before the government reseeds the treatment area with new grass has offset the cost of plowing. The contractor recovers the cost of plowing through the sale of the harvested grain, resulting in no cost to the government for plowing. Direct cost to the government are estimated at $21.00 per acre for burning, and $40.00 per acre for reseeding with a traditional seed mix. If a native seed mix, including sagebrush, is used, the cost may be as high as $74.00 per acre. The cost of treatment also includes the cost of administration of the range program on the Grassland as described above.

The economic efficiency analysis considered grazing, recreation and tourism and did not isolate the costs of particular treatments. Benefit:cost ratios will be determined at the site-specific NEPA level during project analysis.

Reserves/Preserves

Issue Statement: Some people advocate managing a significant portion of the Grassland as a "reference reserve" or a "fish, wildlife, and plant reserve."

Issue Indicator: Acres managed without livestock grazing (unsuitable acres)

Baseline Indicator: Current acres managed without livestock grazing: Approximately **1,000 acres**

Scales Used for Analysis: Grassland only

Temporal Scale: 45 years

Currently most of the Grassland is managed for a variety of uses, including livestock grazing. A small portion of the Grassland, approximately 1,000 acres, is currently managed exclusively for wildlife, including Sweeten Pond area and tree rows. No livestock grazing is allowed in these areas.

Livestock Grazing

Issue Statement:	Some people feel that the current use level of 60% provides sufficient forage for the current stocking levels and sage grouse nesting habitat. Others feel that the use level is too high and should be reduced to provide higher quality sage grouse habitat.
Issue Indicator:	Estimated Head months based on proposed utilization levels and treatments in each alternative
Base line indicator:	Current Permitted Head Months: **21,480** (Curlew Association: 18,476; Buist Association: 3,004)
Scales Used for Analysis:	Grassland only
Temporal Scale:	10-15 Year Planning Period

Approximately 98 percent, or 46,594 acres, is considered suitable for livestock grazing. Utilization rates are applied to suitable acres only.

Utilization is expressed as a percentage of the weight of forage plants that has been removed by grazing. It can also be expressed as the height of plant material remaining on forage plants after grazing, or commonly called "stubble height." Utilization estimates are indices to make management decisions and are used for monitoring to determine if management objectives are being met. Utilization is not a goal. The timing of grazing is much more important than the percentage of biomass removed from the plant (Frost, *et al.*, 1994).

The current livestock utilization rate is 60 percent grassland-wide. When it appears this level of grazing has been met over most of a field, cattle are moved to the next field. Crested wheatgrass is considered the key species on which utilization is based, because it occurs on the best soils and on the flattest terrain.

Based on conservative estimates of forage production (See Appendix G) and using 60 percent utilization rates on all vegetation types, the Grassland could potentially support between 19,600 and 27,900 Head Months. Current permitted Head Months is 21,400. Average Authorized Use from 1996 to 2001 is approximately 19,500.